UNIVERSITAT JAUME·I
Departament de Química
Inorgànica i Orgànica

UNIVERSITAT JAUME·I
DEPARTAMENT DE Q. INORGÀNICA I ORGÀNICA
Data: 31 OCT. 2014
Núm — ENTRADA
Núm 142 EIXIDA

Antonio Barba Juan
Vicerectorat d'Investigació i Doctorat

Estimat Antonio,

En Consell de Departament celebrat el 31 d'octubre de 2014, es va acordar, per unanimitat, aprovar la proposta presentada pel professor d'este departament, Santiago V. Luis Lafuente, de nomenament del Dr. Julius Rebek, com a Doctor Honoris Causa per esta Universitat. Per a això s'han tingut en consideració les seues importantíssimes contribucions en el camp de la ciència i la tecnologia.

D'acord amb la normativa vigent, s'adjunta amb esta proposta:

- Una breu memòria en què es ressenyen els mèrits més rellevants del Dr. Julius Rebek.
- Cartes d'investigadors/es de prestigi que recolzen la petició.
- Currículum Vitae del Dr. Julius Rebek.

En cas de ser aprovada la proposta actuaria com a padrí el professor Santiago V. Luis Lafuente.

La directora del departament,

Eloísa Cordoncillo Cordoncillo

Castelló de la Plana, 31 d'octubre de 2014

Edifici TC-Ciència i Tecnologia
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Memoria para la concesión del

Doctorado Honoris Causa

de la

Universitat Jaume I

a

Julius Rebek

Director del Skaggs Institute of Chemical Biology

del Scripps Research Institute (TSRI)

de Estados Unidos

Departamento de Química Inorgánica y Orgánica

Universitat Jaume I

Castellón

Octubre de 2014

Preámbulo

La normativa sobre el nombramiento de doctorados “Honoris Causa” de la Universitat Jaume I establece que la propuesta de nombramiento habrá de acompañarse de una “Memoria razonada justificativa de los méritos y circunstancias que concurren favorablemente para proponer al candidato y donde se señale su vinculación con la Universitat Jaume I”.

De acuerdo con lo establecido en dicha disposición, en este documento se recogen de forma resumida los méritos que concurren en el Prof. Rebek, mediante un breve resumen de su trayectoria científica y de los resultados más notables y de mayor impacto de su investigación, así como destacando la importante labor formadora que ha ejercido sobre numerosos investigadores que actualmente están desarrollando su actividad, de un modo notable prácticamente en todos los continentes.

Por otro lado, se señalará la vinculación del Dr. Rebek con la actividad investigadora del Campus Universitario de Castellón, que se inició cuando formaba parte de la Universitat de València, como Colegio Universitario de Castellón, y que ha continuado posteriormente, después de la creación de la Universitat Jaume I de Castellón. La formación investigadora de distintos miembros de nuestra comunidad universitaria es un hito importante de esta relación.

Esta sería la tercera propuesta realizada por nuestro Departamento para el nombramiento de un Químico como doctor Honoris Causa, después de los nombramientos del Dr. Antonio García Verduch en 1997 y del Dr. Avelino Corma en 2008.

Méritos del Dr. Julius Rebek

Trayectoria profesional e investigadora:

Julius Rebek nació en Beregszasz, en Hungría en aquel momento, en 1944 y vivió en Austria entre 1945 y 1949 como consecuencia de los desplazamientos originados con el final de la Segunda Guerra Mundial. En 1949 su familia se trasladó a EEUU y pudo instalarse en Kansas, adquiriendo la nacionalidad americana en 1954. En Kansas realizó su educación básica y completó su educación universitaria en Química en la ***Universidad de Kansas en 1966***, trasladándose posteriormente al ***Massachusetts Institute of Technology (MIT)*** donde realizó su tesis doctoral, bajo la supervisión del Profesor D. S. Kemp, en el campo de la química de péptidos, y obtuvo el título de Doctor en el año ***1970***.

Inmediatamente después de obtener dicho título de Doctor, el Dr. Rebek se trasladó a la ***Universidad de California en Los Ángeles (UCLA)***, una de las universidades pioneras en EEUU en aquel momento, como Assistant Professor, comenzando, a partir de entonces, su actividad investigadora independiente. Entre ***1970 y 1976***, durante su estancia en UCLA, realizó ya una de sus notables contribuciones conceptuales en el campo de la química, con el desarrollo del denominado "***test de las tres fases***" para la detección y estudio de intermedios elusivos de reacción.

Posteriormente, se trasladó a la ***Universidad de Pittsburgh***, en Pensilvania, donde fue Associate Professor entre ***1976 y 1979*** y donde fue promocionado a Professor en 1980, ocupando esta posición entre ***1980 y 1989***. Durante este periodo en la Universidad de Pittsburgh, fue capaz de elaborar nuevos desarrollos conceptuales, en particular en el campo de la Química Supramolecular y del Reconocimiento Molecular que representaron un claro avance sobre los estándares existentes en aquel momento. En primer lugar, y continuando con una línea de investigación ya iniciada en UCLA, desarrollo nuevas familias de receptores abióticos de tipo éter corona cuya actividad estaba regulada mediante estímulos externos, un campo de trabajo que hoy en día se considera una actividad puntera para el desarrollo de sistemas inteligentes. El Dr. Rebek fue el primero en desarrollar ***sistemas sintéticos*** capaces de experimentar una ***regulación alostérica*** capaz de mimetizar el comportamiento de distintos sistemas biológicos como la hemoglobina. En el curso de dichos estudios, se pudieron observar los primeros ejemplos de sistemas sintéticos que podían definirse como ***máquinas moleculares***, otro campo de trabajo de gran interés y actualidad, donde, posiblemente, se están produciendo algunos de los avances más importantes hoy en día, en la frontera entre la química, la ciencia de los materiales y la biología. También

durante su periodo en Pittsburgh, el Prof. Rebek desarrolló una nueva familia de receptores sintéticos basados en la generación de cavidades tridimensionales caracterizadas por la presencia de grupos funcionales convergentes, lo que permitía explotar al máximo los efectos estereoelectrónicos de los grupos implicados tanto en procesos de reconocimiento como en procesos catalíticos (se denominaron ***cleft-like molecules***). Se trataba, de nuevo, de una aportación pionera, en la que un sistema no natural, puramente sintético, era capaz de mimetizar alguno de los elementos clave de los centros enzimáticos. Se trataba, además de un conjunto de sistemas de alta versatilidad estructural y donde, por primera vez, no se necesitaba la generación de un sistema macrocíclico para alcanzar la preorganización adecuada de los elementos de reconocimiento y/o catalíticos.

En 1989 volvió como Professor de nuevo al MIT, el centro en el que había realizado su tesis doctoral, y donde ocupó la plaza de ***Camille Dreyfus Professor of Chemistry*** a partir de 1991. Durante este periodo en el ***MIT (1989-1996)***, continuó trabajando con los receptores preorganizados antes mencionados y completó un nuevo reto científico, de una gran resonancia, como fue el desarrollo de ***sistemas autoreplicantes*** completamente sintéticos. Por primera vez, fue posible el generar compuesto químicos capaces de catalizar su formación (autoreplicarse) sin necesidad de utilizar los elementos clásicos presentes en el material genético (por ejemplo bases púricas o pirimidínicas) que es la estructura biológica que mejor define la capacidad de autoreplicación.

En ***1996*** se creó, mediante la inciativa de una fundación privada, el Instituto de Investigación Scripps (***The Scripps Research Institute, TSRI***) en La Jolla, al norte de San Diego en Calinfornia, con el objetivo de convertirse en el centro de investigación de referencia en EEUU (y por tanto a nivel mundial) en diferentes áreas de conocimiento, en particular aquellas relacionadas con el conocimiento del mundo biológico, entre las que se encontraba la Química. Desde su inauguración, el Prof. Rebek ha formado parte de esta iniciativa como ***Director del Skaggs Institute for Chemical Biology y Professor of Chemistry***, uno de los componentes investigadores esenciales de TSRI. A partir de ese momento, el trabajo del profesor Rebek se centró en completar el desarrollo de una nueva línea de trabajo de muy amplia repercusión como fue el estudio de sistemas capaces de autoensamblarse. En particular, su trabajo se centró en la preparación de distintos tipos de ***cajas moleculares autoensambladas***, capaces de generar en su interior una cavidad tridimensional dinámica en la que podían encapsularse distintas moléculas cuyas propiedades físicas y químicas podían llegar a ser modificadas muy notablemente. De nuevo se trataba de una aportación novedosa en el campo de la química biomimética. En esa época, el *Dr. Rebek enumeró la regla del 55%* que define la ocupación ideal de una cavidad en un proceso de reconocimiento receptor-sustrato y que en la actualmente es utilizada de modo habitual por todos los investigadores que trabajan en este campo. En paralelo al trabajo con “contenedores moleculares”

(molecular containers), el profesor Rebek ha estado trabajando en los laboratorios del Skaggs Institute en el desarrollo de sistemas para la ***detección y destrucción de agentes de guerra química***, en particular agentes nerviosos.

Finalmente, en Noviembre de ***2013***, y sin abandonar su trabajo en TSRI, el Prof. Rebek abrió un laboratorio de investigación en el Departamento de Química de la ***Universidad de Fudan*** en Shangai (China) donde es Visiting Professor, dentro del programa chino de captación de talentos (1000 Talents).

La trayectoria profesional e investigadora que se ha resumido en los párrafos anteriores muestra con claridad que el Prof. Julius Rebek es uno de los líderes mundiales en el área de investigación que podemos definir de modo genérico como Química Supramolecular y ha realizado aportaciones clave para el desarrollo de la Química, tal como la conocemos actualmente, en los campos de la Química Orgánica Física, la Química Biológica o la Química Bioorgánica.

La enorme ***creatividad científica*** del Prof. Rebek es posiblemente el rasgo definitorio más característico de su actividad durante estos años. De modo continuo, sus contribuciones científicas han sido pioneras y han creado nuevos campos de actividad en los que actualmente desarrollan su trabajo investigador, en la frontera actual del conocimiento, numerosos investigadores de alto nivel, un buen número de los cuales se ha formado a nivel predoctoral o, sobre todo, posdoctoral con el Dr. Rebek.

Aunque el trabajo investigador que hemos descrito se encuadra mayoritariamente en el campo de la Ciencia Básica, la búsqueda de potenciales aplicaciones prácticas de esos estudios ha sido igualmente una constante en el quehacer científico del Prof. Rebek, lo que se ha reflejado en la obtención de distintas patentes y en su colaboración, a distinto nivel, con numerosas empresas tecnológicas, algunas de las cuales se mencionarán posteriormente.

El prestigio científico del Dr. Rebek se ha visto reflejado en su participación al más alto nivel en numerosos congresos científicos y en la impartición de un elevadísimo número de conferencias en los centros de investigación más prestigiosos. Algunos de estos datos se recogen en el CV del Prof. Rebek que se acompaña.

Sus publicaciones, por otro lado, han aparecido en las revistas más prestigiosas de la investigación científica, e incluyen publicaciones en Nature, Science o Proceedings of the National Academy of Sciences, así como en las revistas más relevantes del ámbito químico como Angewandte Chemie, Journal of the American Chemical Societe, Chemical Communications, etc. Durante su trayectoria profesional ha pertenecido a los ***Advisory Boards*** de numerosas revistas de gran prestigio entre las que se encuentran las siguientes:

Journal of Molecular Recognition, 1987-1995

Chemtracts, 1987-1996

Bioorganic and Medicinal Chemistry Letters, 1991-2001

Bioorganic and Medicinal Chemistry, 1991-2001

Journal of the Chemical Society, Perkin Transactions, 1992-1998

Chemistry and Biology, 1994-

Accounts of Chemical Research, 1996-1998

Journal of Organic Chemistry, 1996-2000

Current Opinion in Chemical Biology, 1997-

Tetrahedron Publications, 1991-2001

Progress in Physical Organic Chemistry, 1998-2002

Journal of Supramolecular Chemistry, 2001-

Igualmente, ha actuado en el los comités científicos asesores (***Scientific Advisory Boards***) de numerosas ***compañías*** de carácter comercial:

Amira (RepliGen), Cambridge, Massachusetts 1990 -1994

Procept, Cambridge, Massachusetts 1991-1997

Darwin Molecular, Seattle, Washington 1992-1995

Cubist Pharmaceuticals, Cambridge, Massachusetts 1992-2001

Discovery Partners International, La Jolla, California, 1996-2001

EPIgen, La Jolla, California, 1996-2001

Synteni (Incyte), Fremont, California, 1997-2001

LaunchCyte, Pittsburgh, PA, 2000-2002

Neogenesis, Cambridge, Massachusetts, 1997-2003

Personal Chemistry, Uppsala, Sweden, 1999-2003

Activx, La Jolla, CA, 2001-2004

Kémia, La Jolla, CA, 2002-2008

Finalmente, destacar la participación en los ***comités asesores*** de diferentes ***instituciones*** de carácter científico e investigador, entre las que cabe destacar su participación en el comité asesor del Instituto de Investigación Química (ICIQ, Tarragona) y otros centros como los siguientes:

Board on Chemical Sciences and Technology, National Research Council, 1992.

University of Chicago, Physical Sciences Division, Chicago, Illinois, 2000-2006

National Cancer Institute, National Institutes of Health, Bethesda, MD, 2001-2004

The Institute of Chemical Research of Catalonia, Spain, 2001-

Elector, University of Oxford, Chair in Chemical Biology, 2001

Member, Wittgenstein Prize and START Award Jury, Vienna, Austria, 2008 –

Center for Integrated Protein Science, Munich, 2009-

Member, Committee to Assess Supercritical Water Oxidation System Testing for the Blue Grass Chemical Agent Destruction Pilot Plant, National Research Council, 2012-2013.

Member, Standing Committee on Chemical Demilitarization, Board on Army Science and Technology, National Academy of Science, 2013-

Cabe destacar igualmente que el Prof. Rebek ha realizado estancias en distintos centros internacionales del mayor prestigio como ***Visiting Professor***. Entre estas estancias, por su relevancia en esta solicitud cabe destacar la estancia realizada en el Campus del Colegio Universitario de Castellón en 1986:

Technical University of Munich, Germany, 1981

University of Valencia, Colegio Universitario de Castellon, Spain, 1986

Ecole Normal Superior, Paris, 1997

Harvard University, 2002

University of Paris V, 2008

LMU, Munich, 2009

Free University of Berlin, Germany, 2009

Fudan University, Shanghai, China, 2013-

La importancia de sus contribuciones científicas ha dado lugar a la concesión de distintos ***premios y distinciones***. Entre las mismas cabe destacar la concesión del Doctorado Honoris Causa por la Universidad de Bonn en 2010.

A. P. Sloan Fellow, 1976-1978

A. von Humboldt Fellow, 1981

J. S. Guggenheim Fellow, 1986

A.C. Cope Scholar Award, 1991

American Academy of Arts and Sciences, 1993

National Academy of Science, 1994

James Flack Norris Award in Physical Organic Chemistry, ACS, 1997

Hungarian Academy of Science, 2001

American Institute of Chemists, Chemical Pioneer Award, 2002

Ronald Breslow Award for Achievement in Biomimetic Chemistry, ACS 2004

European Academy of Science (Academia Europaea) Member, 2005

Distinguished Scientist Award, ACS, San Diego, California, 2006

University of Oregon Creativity Award in Chemistry, Dance and Music, 2007

Tau-Shue Chou Award, Academia Sinica, 2008

A. von Humboldt Senior Scientist Award, Germany, 2009

Honorary Doctorate, University of Bonn, 2010

Nichols Medal, ACS New York Section, 2011

Prelog Medal, ETH Zurich, 2012

Contribuciones científicas más importantes y relevancia internacional:

Tal como se ha destacado en el apartado anterior, las contribuciones científicas del Prof. Rebek han sido muy notables, habiendo desarrollado una labor pionera en muchos ámbitos que ha sido reconocida con numerosos premios y distinciones. Si consideramos los indicadores científicos más importantes en la actualidad, debemos señalar que el Dr. Rebek ha publicado más de 600 artículos científicos en revistas de alto prestigio y que han alcanzado una enorme repercusión como lo muestra el hecho de que los mismos hayan recibido un total de casi 25000 citas (>citas por artículo),

dando lugar a que el índice h (Hirstch) que actualmente mide el impacto de la obra científica de un investigador, haya alcanzado para el Prof. Rebek un valor de 82. Es decir, 82 de sus artículos han sido citados 82 veces o más en la literatura científica. De hecho, 10 de sus publicaciones han recibido alrededor de 300 o más citas, un impacto extraordinario para una contribución científica.

Por otro lado, las publicaciones en las que han aparecido publicados los resultados científicos considerados son, en general del más alto nivel. Los siguientes datos recogen sus contribuciones en la revistas de mayor prestigio en el ámbito de la Ciencia en general y en el ámbito de la Química en particular. La lista completa de las contribuciones científicas se recoge en el CV que se acompaña.

Science (11 artículos)

Nature (5 artículos)

Angewandte Chemie International Edition (72 artículos)

Journal of the American Chemical Society (174 artículos)

Chemical Communications (42 artículos)

Otro elemento igualmente importante a la hora de definir la relevancia internacional del Prof. Rebek es su capacidad de formar investigadores del más alto nivel. Esta formación ha sido especialmente relevante al nivel posdoctoral dada la naturaleza de alguna de las instituciones en las que ha desarrollado su labor investigadora (MIT y TSRI). Así, más de 160 investigadores posdoctorales han pasado por los laboratorios del Dr. Rebek y más de 50 de ellos han obtenido, posteriormente, puestos académicos de relevancia tanto en USA y Canadá como en Asia (Japón y China) o en Europa (principalmente Alemania y España). Muchos otros se han convertido en *group leaders* en los departamentos de investigación de numerosas compañías de alto nivel.

La vinculación del Prof. Julius Rebek a la actividad investigadora de Castellón:

Tal como se ha ido mencionando en varias ocasiones, la vinculación del Prof. Rebek a la investigación realizada en el Campus Universitario de Castellón, primero en su etapa como Colegio Universitario adscrito a la Universidad de Valencia y posteriormente en su etapa como Universitat Jaume I ha sido constante.

El Prof. Francisco Gaviña, ya fallecido, que fue uno de los primeros profesores de universidad en el Colegio Universitario de Castellón, fue igualmente uno de los primeros investigadores posdoctorales en el grupo del profesor Rebek en el periodo en el que trabajó en UCLA. Durante este tiempo, el Dr. Gaviña trabajo en la línea de investigación asociada a la aplicación del denominado test de las tres fases, línea de

investigación que posteriormente se continuó en el Campus Universitario de Castellón, donde se leyeron varias tesis doctorales relacionadas con dicha técnica. Posteriormente y ya en su etapa en Pittsburgh, los Profesores Santiago Luis y Maria Isabel Burguete, actualmente catedráticos de universidad en la Universitat Jaume I, realizaron una estancia en su laboratorio trabajando tanto en el estudio de receptores sintéticos con regulación alostérica como en el trabajo con receptores con grupos convergentes. También en la etapa del Prof. Rebek en Pittsburgh, la Dra. Ana Costero, actualmente catedrática de Química Orgánica en la Universidad de Valencia, realizó una estancia trabajando en la línea de trabajo relacionada con los receptores con grupos convergentes.

Fruto de esta colaboración ha sido la realización, en los comienzos de la actividad investigadora del Colegio Universitario de Castellón, de varios proyectos conjuntos de investigación financiados por el Comité Conjunto Hispano-Americano o con financiación privada.

El Prof. Rebek ha visitado nuestro campus en diversas ocasiones, la primera de ellas como conferenciante invitado de la XX Reunión Bienal de la Real Sociedad Española de Química, celebrada en Castellón en 1984, organizada por nuestro grupo de trabajo. Posteriormente realizó una estancia de mayor duración, como ya se ha mencionado, en 1986 y nos visitó de nuevo en 2014.

La relación del Prof. Rebek con España no se circunscribe, además, a nuestra Universidad o a la cercana universidad de Valencia. A partir de la interacción con nuestro grupo, un número importante de investigadores españoles, no inferior a 15, se han formado con el Dr. Rebek a nivel posdoctoral. Muchos de estos investigadores continúan desarrollando su actividad investigadora en distintas universidades y centros de investigación españoles.

Octubre 2014

Pablo Ballester,
Profesor de Investigación ICREA
Institut Català d'Investigació Química (ICIQ)
Av. Països Catalans, 16
43007 Tarragona, España
29 de Octubre de 2014

JUNTA DE GOBIERNO DE LA UNIVERSITAT JAUME I
Av. de Vicent Sos Baynat, s/n
12071 Castelló de la Plana, España

Ilmo. Sr. Rector de la UJI y estimados miembros de la Junta de Gobierno:

En este escrito deseo expresar públicamente mi apoyo total y sin reservas a la propuesta del Prof. Santiago Luis Lafuente para que el Prof. Julius Rebek Jr., Director del Instituto Skaggs, encuadrado en el Instituto de Investigación Scripps de la Jolla, California, EEUU, sea nombrado Doctor Honoris Causa de su Universidad.

Breve exposición de los logros científicos y académicos del Prof. Rebek:

El Profesor Rebek describió hace 25 años los primeros ejemplos de lo que hoy en día se denominan máquinas moleculares. Se trataba de rotores biarílicos que transmitían al información del reconocimiento molecular desde un centro de complejación en la molécula a otro centro remoto haciendo uso de un cambio conformacional. Estos compuestos constituyen los primeros ejemplos descritos del efecto alostérico en sistemas químicos y condujeron a la síntesis de poliéteres macrocíclicos que mostraron cooperatividad positiva. Hoy en día, las nanomáquinas capaces de efectuar rotaciones unidireccionales, como las descritas por el Prof. Feringa, incorporan rotores moleculares basados en los principios introducidos por Rebek. En 1990, Rebek sorprendió a la comunidad científica demostrando la capacidad de un compuesto sintético para auto-replicarse. Hasta este momento se consideraba que la capacidad de auto-replicarse era exclusiva de los ácidos nucleicos. Posteriormente, investigadores como Gadhiri, Sutherland y Philp demostraron que los modelos de auto-catálisis de Rebek eran

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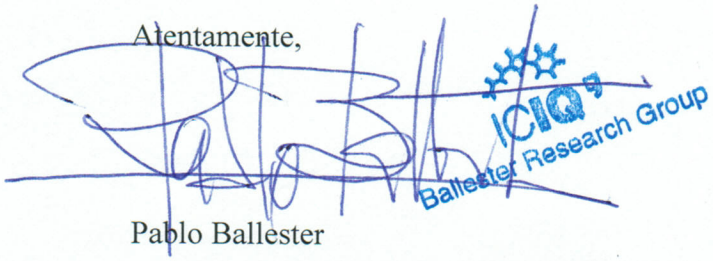
consecuencias generales de moléculas auto-complementarias. En 1993, Rebek demostró que el auto-ensamblaje molecular podría servir para desarrollar una forma definitiva de reconocimiento molecular, la encapsulación reversible. Más recientemente, utilizando diversos ensamblajes multi-moleculares ha revelado el porcentaje adecuado en que el espacio/volumen de una cavidad debe rellenarse a escala nanométrica y cómo es posible estudiar moléculas aisladas y no solvatadas en disolución usando contenedores molecuclares. Conformaciones moleculares desconocidas, relaciones isoméricas inimaginables, código binario, espacios quirales y nano-dispositivos accionados por resorte moleculares han surgido de la investigación de Rebek en procesos de encapsulación reversible.

El Prof. Rebek es y ha sido también un excelente mentor. En su grupo se ha formado numerosos investigadores que han alcanzado prestigio internacional. Algunos de ellos realizan su labor investigadora en España. Por ello, cabe significar la contribución del Prof. Rebek al alto nivel científico alcanzado por la Química Supramolecular en España. En particular, destacan en este campo varios investigadores del Departamento de Química Inorgánica y Orgánica de su Universidad que son discípulos del Prof. Rebek.

Por todos los méritos que he expuesto anteriormente, no me queda ninguna duda de que el Prof. Rebek es un candidato idóneo para ser nombrado Doctor Honoris Causa por la Universitat Jaume I de Castelló.

Atentamente,



Pablo Ballester

ICREA Research Professor

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Grupo Especializado de Química Orgánica
REAL SOCIEDAD ESPAÑOLA DE QUÍMICA
http://www.um.es/geqor/

Joan Bosch
Presidente
joanbosch@ub.edu

Barcelona, 29 de octubre de 2014

Profesor Santiago V. Luis
Departamento de Química Inorgánica y Orgánica
Universitat Jaume I
Avda. Sos Baynat, s/n
E-12071 Castelló de la Plana

Apreciado Prof. Luis,
Como presidente del Grupo Especializado de Química Orgánica de la Real Sociedad Española de Química, es para mi un placer avalar la candidatura del Prof. Julius Rebek a Doctor Honoris Causa de la Universitat Jaume I.
El Prof. Rebek es uno de los más prestigiosos científicos a nivel mundial en el ámbito de la química supramolecular y la química biorgánica. Desde 1996 desarrolla su labor investigadora en *The Skaggs Institute of Chemical Biology* del *Scripps Research Institute*, en la Jolla, California. En la actualidad desarrolla líneas de trabajo en campos tan punteros como reconocimiento molecular y catálisis, autoensamblaje y encapsulación molecular, sensores y antídotos para agentes de guerra química, y miméticos de proteína de superficie.
Ha publicado unos 600 trabajos de investigación en las más prestigiosas revistas científicas, entre las que destacan *Science* and *Nature*, y numerosos capítulos de libro. Ha impartido conferencias invitadas en numerosas universidades y centros de investigación de todo el mundo, y es miembro del Consejo editorial de un gran número de revistas científicas. Ha sido Profesor Visitante en diversas universidades, entre ellas la Universitat Jaume I. En reconocimiento a sus aportaciones y a su liderazgo ha recibido numerosos premios y distinciones por parte de universidades y sociedades científicas de diversos países.
De manera adicional a sus méritos científicos, deseo destacar que el Prof. Rebek ha ejercido una influencia altamente positiva en el desarrollo de la química, y en particular de la química supramolecular, en la Universitat Jaume I, en Castellón de la Plana. Cuatro profesores del campus de Castellón (Francisco Gaviña, Ana Costero, Santiago V. Luis y M. Isabel Burguete) han realizado estancias postdoctorales en los laboratorios del Prof. Rebek, quien en diversas ocasiones ha impartido conferencias en la Universitat Jaume I.
Sus contribuciones y su creatividad en los campos de la química supramolecular, del reconocimiento molecular y de la biología química han inspirado y estimulado a muchísimos científicos, y la originalidad y excelencia de su trabajo ha influido y sigue influyendo de manera muy decisiva en la química orgánica actual.
Por todo lo expresado en los párrafos anteriores, recomiendo sin reserva alguna la concesión del título de Doctor Honoris Causa por la Universitat Jaume I al Profesor Julius Rebek.

Joan Bosch
Catedrático de Química Orgánica
Presidente del GEQOR del la RSEQ

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München, den 04.11.2014

To whom it may concern

Prof. Julius Rebek is one of the most renowned and most active scientists on a world-wide scale. Prof. Rebek is one of the pioneers in the field of supramolecular chemistry and for many years he was one of the leading figures. He was the first who used systematically hydrogen bonds to create molecular complexes in organic solvents. He is a pioneer in the field of investigating the strength and dependencies of hydrogen bonds. He developed principles that are today discussed in all textbooks of supramolecular chemistry. With the help of correctly positioned hydrogen bonds using additionally π-stacking forces, he was able to create host molecules for specific recognition of DNA bases. He could use the principles of molecular recognition to catalyze chemical reaction and these ideas culminated in the discovery of one of the first non-nucleic acid based replicators that function in organic solvents.

In recent years he developed the concept of molecular capsules. Using hydrogen bonds he was able to create assemblies that surround “unfilled” space. He was able to show that this space can be specifically occupied by guest molecules having complementary shape to the interior of the capsules. The capsule idea was later on utilized by other researchers particularly by Fujita and Stang to create capsules that are hold together not only by

hydrogen bonds but also by metal coordination forces. Recently Shionoya used the idea to create the first moveable parts in such capsules on the way to molecular machines. Julius Rebek was clearly the first to introduce the molecular capsule principle, where the capsules are connected exclusively by a seam of complementary hydrogen bonds. Recently it was possible to show that in these capsules molecules like alkenes are bound in helical conformations and he was already able to perform chemical reactions in these capsules.

Without any doubt Prof. Rebek is one of the leading scientists on a world-wide scale in the field of supramolecular chemistry. When it comes to hydrogen bonding he is clearly the number one. He is one of the most cited chemists and this as a person who has not written extensive amounts of review articles. Each of his publications is on average cited 33 times which addresses the high relevance of his work. This number shows that he is carefully publishing and that he applies the highest quality standards to each of his publication. I support the nomination of Julius Rebek in the strongest possible form. He is a clear leader in the field. The number one in supramolecular chemistry in organic solvents!

Prof. Dr. Thomas Carell

Prof. Javier de Mendoza
The Institute of Chemical Research of Catalonia

A QUIEN CORRESPONDA

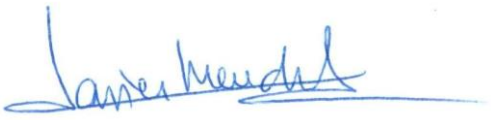
Cuando el Profesor Santiago V. Luis me informó sobre el proyecto de nombramiento del Profesor Julius Rebek, Jr., como Doctor Honoris Causa por la Universidad Jaume I y me solicitó una carta de recomendación sobre dicha iniciativa, sentí una profunda alegría, ya que eso me brinda la oportunidad de glosar brevemente los méritos de un científico de primera fila mundial.

El Profesor Rebek no es tan sólo un químico famoso, con cientos de publicaciones en las revistas de más impacto científico, miembro de la Academia Nacional de Ciencias de Estados Unidos y director del Instituto Skaggs en el Instituto Scripps de EEUU, una institución de gran prestigio internacional, sino que además destaca por su labor pionera en el inicio de nuevas líneas de investigación de gran impacto creativo, que han promovido numerosas actividades en todo el mundo, siguiendo las líneas marcadas por sus contribuciones en el campo del reconocimiento molecular y la auto-asociación.

Una de sus primeras aportaciones imaginativas fue el desarrollo de un original método de estudio de mecanismos de reacción (método de las tres fases), en el que contribuyó un colaborador español, el primero de los muchos que ha tenido a lo largo de su carrera, el ya fallecido Profesor Francisco Gaviña. En la Universidad de Pittsburgh, donde entonces trabajaba, comenzó sus estudios sobre química supramolecular, centrados inicialmente en aspectos conformacionales y cinéticos de la complejación con éteres corona, en los que contribuyeron otros investigadores españoles, como el ya mencionado Profesor Santiago V. Luis. Sin embargo, los estudios que le comenzaron a hacer mundialmente famoso se relacionaron con sistemas auto-replicantes (moléculas capaces de catalizar la formación de réplicas de sí mismas), basados en creativos diseños de estructuras unidas a través de enlaces de hidrógeno. Tras su traslado al prestigioso MIT, en Cambridge (Mass), prosiguió sus estudios de replicación molecular, en los que contribuyó decisivamente otro discípulo español, el Profesor Pablo Ballester, y diseñó los primeros ejemplos de cápsulas auto-asociadas, trabajos en los que tuvimos el honor de colaborar, que aumentaron aún de forma más marcada su amplio reconocimiento internacional. Más recientemente se trasladó al Instituto Scripps de La Jolla (Cal) en donde ha estado trabajando hasta la actualidad.

En los ejemplos indicados he pretendido resaltar un aspecto de la actividad del Profesor Rebek que tiene especial interés para nuestro país, como son las colaboraciones y los numerosos discípulos españoles que han pasado por su laboratorio, que hacen que una propuesta de doctorado Honoris Causa como la que ahora se realiza (creo que por primera vez en España) cobre un especial relieve y significación. Por todo ello, me adhiero sin reservas a la propuesta de nombramiento, Creo que no sólo le honra a él como científico sino también a nuestro país por la labor que ha desarrollado.

Tarragona, 28 de octubre de 2014



Javier de Mendoza
Catedrático de Química Orgánica (jubilado), Universidad Autónoma de Madrid (UAM)
Group Leader en el Instituto Catalán de Investigación Química (ICIQ), Tarragona

Barcelona, 28 de Octubre de 2014

A quien pueda interesar:

El motivo de esta carta es expresar mi apoyo incondicional a la concesión por parte de la Universitat Jaume I del galardón de Doctor Honoris Causa al insigne investigador Profesor Julius Rebek, de The Scripps Research Institute en La Jolla (California, EEUU). El Profesor Rebek es un investigador de referencia internacional en Química Orgánica y, más concretamente, en el campo multidisciplinar de la Química Supramolecular, rama de la Química que estudia las interacciones entre moléculas con las consiguientes implicaciones en campos tan diversos como la Nanotecnología, la Biología o la Biomedicina. Las investigaciones del Dr. Rebek han supuesto un auténtico hito en el estado del arte en este campo, como lo demuestra su extenso y extraordinario currículum. Los trabajos del Profesor Rebek sobre la creación de nanoespacios moleculares artificiales para el reconocimiento molecular de especies químicas, su control estructural, transporte o transformación mediante procesos de catálisis selectiva han abierto caminos en la investigación básica para la comprensión de dichos fenómenos, así como en su potencial aplicación en diversos ámbitos de la ciencia y la tecnología. Sin duda, el Profesor Rebek ha sido uno de los investigadores más importantes de finales del siglo XX y principios del XXI, y ha influido enormemente a cambiar nuestra percepción de la naturaleza microscópica de la materia que nos rodea.

La enorme calidad de su investigación ha ido, además, estrechamente unida a su capacidad de formación de científicos del más alto nivel. Basta con echar una ojeada a la lista de antiguos estudiantes y post-doctorales que han pasado por su laboratorio para percatarse de que aparecen muchos de los investigadores de mayor renombre internacional, incluidos muchos de los investigadores españoles de primer nivel. Por tanto, sin duda se trata de unos de los químicos más influyentes de nuestra era.

Finalmente, cabe destacar que la excelente calidad científica de su persona va unida a una calidad humana también excelente. Estas dos características que no suelen unirse en una misma persona, hacen de Julius Rebek una figura singular que seguro será referencia para futuras generaciones de científicos.

Quedando a su disposición para futuras aclaraciones que pudiere necesitar.

Atentamente,

Dr. Ignacio Alfonso Rodríguez
Científico Titular del CSIC e Investigador Principal del grupo de Química Supramolecular en IQAC
e-mail: ignacio.alfonso@iqac.csic.es

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Apreciados señores/as,

A propuesta del Dr. Santiago Luis, catedrático de la Universitat Jaume I, he sido invitado a apoyar la candidatura del profesor Julius Rebek Jr. al título de Doctor Honoris Causa por esta universidad, lo cual hago con mucho gusto.

Mi relación profesional con el Dr. Rebek empezó en septiembre de 2007, cuando inicié mi estancia post-doctoral en su grupo de investigación, que se prolongó por tres años. Mi estancia en el grupo del Dr. Rebek fue muy provechosa y ha contribuido de forma muy importante al desarrollo de mi carrera científica. En la actualidad soy investigador Ramón y Cajal en la Universitat de Girona donde estoy iniciando una línea de investigación en química supramolecular.

El Dr. Rebek es, de hecho, uno de los pioneros de lo que hoy consideramos la química supramolecular moderna, y es en gran medida responsable de la introducción de esta disciplina en España. Él introdujo en este campo a muchos investigadores españoles, la mayoría de los cuales han desarrollado a su vuelta a España programas de investigación en química supramolecular, en la UJI y en muchas otras instituciones como el Consejo Superior de Investigaciones Científicas (CSIC, La Laguna) o el Institut Català d'Investigació Química. (ICIQ, Tarragona). La producción científica del Dr. Rebek es abrumadora, tanto en cuantidad como en calidad, con unas 500 publicaciones que acumulan alrededor de 10.000 citas en total. Entre sus contribuciones científicas destacan los estudios de autoensamblaje y de encapsulamiento con moléculas orgánicas sintéticas.

Por todas estas razones considero que su valía para optar al título de Doctor Honoris Causa está más que justificada, sobre todo a la vista de su enorme influencia en el desarrollo de la química supramolecular en España.

Atentamente,

Agustí Lledó

Girona, 5 de noviembre de 2014

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UdG 3

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Mgco. Sr. Rector de la
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Castelló de la Plana

Burjassot 22 de octubre de 2014

Muy Sr. mío,

He tenido conocimiento de la candidatura del Prof. Julius Rebek para la concesión del título de Doctor "Honoris Causa" por esa Universidad y deseo, a través de la presente carta, manifestar mi apoyo a dicha candidatura.

El Prof. Rebek es un científico de reconocido prestigio internacional y su investigación ha resultado clave en el campo de la Química Supramolecular y en concreto del autoensamblado y la autorreplicación. Sus experimentos han sido en muchas ocasiones punto de partida para el desarrollo de aplicaciones de gran interés no solo teórico sino con proyección de futuras aplicaciones.

Por otra parte, del Prof. Rebek ha mantenido desde el año 1974 una relación fluida y continuada con las distintas universidades de la Comunitat Valènciana y en concreto con la Universitat Jaume I. Esta relación ha propiciado que algunas de las investigaciones que actualmente desarrollan en la Universitat Jaume I tengan sus raíces más profundas en los fundamentos establecidos por el Prof. Rebek.

Por todo ello, considero que la concesión del Doctorado "Honoris Causa" al Prof. Rebek constituiría un justo reconocimiento tanto a sus aportaciones a la ciencia como a su contribución al desarrollo de investigaciones de calidad en nuestras universidades.

Atentamente,

Ana M. Costero

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August 25, 2014

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Dear Professor Luis:

I am writing to give my enthusiastic support for awarding **Prof. Julius Rebek, Jr.**, the Honoris Causa degree from University Jaume I of Castellón, Spain. I think it is a brilliant recognition that is well deserved.

It is difficult to summarize Rebek's accomplishments, simply because they are so broad and so impactful. Rebek's early work provided the "three phase test," a new tool for the study of reaction mechanism and reaction intermediates, as well as the fundamental knowledge of multi-reactant reaction mechanisms that he unearthed while applying it. His subsequent work on the strength and nature of intermolecular interactions, and particularly hydrogen bonding, is classic stuff. Again, he left a legacy of not only new information (the magnitude of hydrogen bonding and weak intermolecular interactions between stacked aromatic rings, and a framework for considering secondary electrostatic interactions in multiple hydrogen-bonded systems), but also a new set of tools: the use of molecular clefts. Such is its impact, that were this area of inquiry his only contribution to scholarship, he would still be a historic figure in chemistry. But, of course, it is not. His use of hydrogen bonding as the basis of purely synthetic, abiotic self-replicating chemical systems was the first of its kind, and a masterstroke of creativity that opened the eyes of a worldwide community to the power of molecular recognition and weak interactions. Here his historic status was raised another notch, but not yet finished. His later work on molecular encapsulation is yet another tour de force, providing new insights into the power of shape and size on the way that molecules interact, coupled with a control over the time scales on which those interactions are allowed to occur.

A real technical analysis of any of these contributions would require a textbook, or at least a long chapter, to do true justice, and I suspect that the details are not in question. But I think a summary is the truly important bit of information, and I wish to make two main points:

First, that the insights Rebek's scholarship have provided are among the most fundamental and important areas of the molecular sciences, and shown that the complexity that has evolved to give rise to living systems can be reduced and brought out of man-made

systems: He has asked and answered questions about the forces that guide how proteins and DNA interact and function; he has asked and provided new answers about how molecules can make additional copies of themselves; he has asked and provided new strategies about the importance of compartmentalization — the segregation of molecules into different containers that can then be mixed on demand. His work has foreshadowed systems-level approaches to chemical function, a topic only recently coming to fore but representing the next vanguard in the molecular sciences.

But ***second***, it is the *manner* in which Rebek has made these advances that at the end of the day might be the most impactful. It is always true that we all stand on the shoulders of giants, and every scientist is indebted to the foundation laid by those who came before. But there are occasions, very rare but important occasions, in which the contributions of a single individual are such a departure from what has come before, in which the level of creativity is so high, that it takes away the breath of an entire community and sends shock waves of inspiration across the globe. Julius Rebek has provided not one, but a small handful of these very rare moments. He has been a molecular architect of the highest order, raising the bar for molecular design and creativity to an unparalleled level. And the impact has been so great, and so many have rushed to expand the blend of artistic creativity and scientific rigor, that it is perhaps hard to remember that we did not always see the molecular world and its possibilities in the way that we now do. Other chemists simply did not try to do the things that Rebek did, until he showed that it was possible and how it could be so important. He is, in my estimation, perhaps the most creative chemist of his generation in the world. He is truly a giant, and his shoulders are not only tall, but broad, allowing many to see farther than would have otherwise been possible.

I was lucky to spend over a year as Julius Rebek's colleague during his time at the Scripps Research Institute. His scientific vision and creativity were then, and continue to be now, an inspiration. I can think of no chemist more deserving of your Honoris Causa degree. Awarding it to Prof. Rebek, in my opinion, would honor both him and your institution.

Please do not hesitate to ask if I can provide any additional information.

Warmest regards,

Stephen L. Craig
William T. Miller Professor
Chair, Department of Chemistry
Duke University

Departamento de Química
Orgánica e Inorgánica
Universidad de Oviedo

ASTURIAS
CAMPUS DE EXCELENCIA
INTERNACIONAL
AD FUTURUM

Oviedo, 5 de Noviembre de 2014

Alfonso Carlos Valdés Gómez, Profesor Titular de Química Orgánica de la Universidad de Oviedo, por medio de la presente expreso mi pleno apoyo a la propuesta de nombramiento de Doctor Honoris Causa por la Universitat Jaume I de Castellón al Profesor Julius Rebek, Jr.

El profesor Rebek tiene una trayectoria científica y académica del más alto nivel. Tras realizar su tesis doctoral en el MIT, bajo la supervisión de D. S. Kemp, inició su carrera científica independiente en el año 1970 como Assistant Professor en la Universidad de California en Los Angeles. Posteriormente ocupo la posición de Full Professor en la Universidad de Pittsburgh, Camille Dreyfus Professor of Chemistry en el Massachusetts Institute of Technology, y desde 1996, en el Scripps Research Institute en San Diego, California, donde ocupa el cargo de Director del Skaggs Institute for Chemical Biology.

Las contribuciones científicas del Profesor Julius Rebek, Jr. se han centrado en la mayor parte de su carrera en el campo de la Química Supramolecular, siendo uno de los impulsores del desarrollo de esta rama de la ciencia. A lo largo de su trayectoria ha ido introduciendo una serie de *conceptos fundamentales* para la comprensión de los procesos de reconocimiento molecular, así como en la creación de entidades supramoleculares con estructuras novedosas e incluso capacidad catalítica o autoreplicante. Entre ellos puede destacarse i) la introducción de receptores sintéticos con grupos funcionales orientados espacialmente (cleft-like receptors) capaces de reconocer selectivamente diferentes tipos de sustratos a través de enlaces de hidrógeno, ii) el diseño y síntesis de moléculas sintéticas auto-complementarias capaces de auto-replicarse, iii) el diseño y síntesis de sistemas de autoensamblaje con cavidades internas cerradas diméricas o tetraméricas, iv) la catálisis en sistemas confinados. Un aspecto común a toda su trayectoria científica es la originalidad y el alto grado de creatividad de su producción científica, que hacen del Profesor Rebek un científico brillantísimo, poco convencional y extraordinariamente influyente. Todo ello está avalado por su elevada producción de publicaciones científicas, así como por las distinciones y honores que ha acumulado a lo largo de su carrera.

También es muy importante destacar la estrecha relación que ha unido a Julius Rebek, Jr. con España y los científicos españoles. Por una parte, el profesor Rebek ha venido manteniendo colaboraciones con diversos grupos de investigación españoles. Por otro lado, un buen número de químicos españoles, entre los que tengo el honor de incluirme, hemos tenido la oportunidad de realizar estancias postdoctorales en sus laboratorios, y que han contribuido de forma decisiva al desarrollo posterior de nuestras carreras científicas.

Por todo ello, reitero mi apoyo a esta la propuesta de nombramiento de Doctor Honoris Causa al Profesor Julius Rebek, Jr., que desde mi punto de vista sería totalmente merecido, así como una honra para la Universitat Jaume I de Castellón.

A. Carlos Valdés Gómez

Prof. Dr. François Diederich
Department of Chemistry and
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Zürich, October 24, 2014

Professor Santiago V. Luis
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Dear Professor Luis:

With this letter, I wish to enthusiastically endorse the proposal of nominating **Professor Julius Rebek, Jr.** from the Skaggs Institute of the Scripps Research Institute in La Jolla, California, for a honorary doctoral degree from the University Jaume I at Castellón. With his pioneering research in molecular recognition, Prof. Rebek has greatly expanded the frontiers of organic chemistry over the past three decades. He made bold contributions to deciphering the cooperative role of multiple weak non-covalent interactions in chemical and biological complexation events, which led to the invention of the first artificial self-replicating systems and self-assembling supramolecular capsules with a unique inner phase for complexation and catalysis. With an unmatched blend of originality, deep thinking, and successful experimental implementation of novel concepts and ideas, he has single-handedly pioneered an unusual range of research areas that have subsequently become the subject of intensive world-wide activities. He also has had a major positive influence on the development of Chemistry, and in particular Supramolecular Chemistry, at the University Jaume I at Castellón, ever since he served as your postdoctoral mentor at the University of Pittsburgh, and has lectured at several occasions in your Institute.

In the early stages of his career at UCLA and at Pittsburgh in the 70ies, Rebek developed the three-phase test (solid-liquid-solid) as an elegant mechanistic tool to test the formation of unstable reactive intermediates. Mechanistic work on the reaction pathways of acyl and phosphate transfer reactions under nucleophilic catalysis provided evidence for the existence at room temperature of elusive species such as monomeric metaphosphate and, in other work, cyclobutadiene (*Tetrahedron* 1979, *35*, 723).

At Pittsburgh in the early 80ies, Julius Rebek developed the first efficient allosteric receptor systems. He showed that the cation binding activity of two crown ether moieties attached to the 2,2'- and 6,6'-positions of a biphenyl scaffold can be regulated in a cooperative way; an investigation far ahead of its time (*Acc. Chem. Res.* 1984, *17*, 258).

With the invention in the mid 80ies of highly preorganized cleft-type receptors composed of two suitably spaced Kemp-triacids and the application of the concept of convergent functional groups, Julius Rebek laid the groundwork for vigorous developments in molecular recognition that largely dominated physical organic chemistry and non-natural product-related synthesis in the following decades (*Acc. Chem. Res.* 1990, *23*, 400; *Angew. Chem. Int. Ed.* 1990, *29*, 245). The Kemp-triacid receptors were the first efficient *cleft-type* receptors. With these systems, multiple H-bonding interactions were introduced for the first time as the central bonding force in synthetic receptors. The intriguing combination of different convergent interaction sites led to the development of some of the most selective synthetic receptors known today, with a powerful adenine receptor (*Science* 1988, *242*, 266) providing a particularly convincing example.

In 1990, while at MIT, Rebek described the first *artificial* self-replicating system (*J. Am. Chem. Soc.* 1990, *112*, 1249; *Acc. Chem. Res.* 1994, *27*, 198) in which a template with a Kemp-triacid and an adenosine recognition site catalyzes the amide bond formation between two components leading to its own replication. Competition, cooperation, and mutation experiments demonstrated the selectivity of this autocatalytic process. A fascinating and equally challenging new frontier for chemistry was born as the Rebek study convincingly showed that replication processes need not be limited to nucleic acids, but can be a general feature of self-complementary systems. Chemical amplification by compartmentalization of reagents in a molecular capsule added another brilliant aspect to this work (*Nature* 2002, *415*, 385).

Taking advantage of highly accurate molecular design and admirable chemical structure intuition, Rebek pioneered in the 1990s at MIT and subsequently at the Skaggs Institute at Scripps the formation of *noncovalent* molecular capsules (*e.g.* the "tennisball", the "softball", etc.) by self-assembly between two or three self-complementary components through up to twelve and more directional H-bonds (*Acc. Chem. Res.* 1999, *32*, 278). Studies of recognition and catalysis within these geometrically confined and stereochemically uniquely defined chiral or achiral systems, which are capable of selectively complexing guests – from methane to adamantane derivatives –, provided a plethora of fascinating results. Rebek together with Mecozzi demonstrated the 55%-rule for the optimal volume occupancy of lipophilic guest molecules bound in a confined lipophilic receptor site (*Chem. Eur. J.* 1998, *4*, 1016). In fact, this rule also holds for biology and is very useful in biomedical research for guiding the optimal filling of hydrophobic pockets in proteins. His comprehensive studies on co-encapsulation of several molecules in capsules gave unprecedented insight into intermolecular phenomena such as solvation and positional stereochemical isomerism (*Angew. Chem. Int. Ed.* 2005, *44*, 2068). He analyzed the conformational preferences of *n*-alkanes in deep receptor sites and discovered that *n*-alkanes prefer helical folding within confined environments in order to optimize volume occupancy (*Science* 2003, *301*, 1219, *Chem. Commun.* 2009, 2777, *Acc. Chem. Res.* 2009, *42*, 1660; *Acc. Chem. Res.* 2013, *46*, 990; *J. Am. Chem. Soc.* 2014, *136*, 5264).

Capsular assembly, which also works in protic solvents (*Chem. Commun.* 2001, 2374), has been expanded by Rebek to the formation of novel supramolecular polymers ("polycaps") (*Proc. Natl. Acad. Sci. USA* 1997, *94*, 7132), some of which display remarkable liquid-crystalline properties (*Angew. Chem. Int. Ed.* 1999, *38*, 2609) and rheological behavior (*Proc. Natl. Acad. Sci. USA* 2000, *97*, 12418).

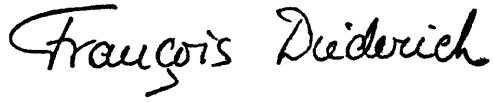
The fusion of convergent geometry with deep cavitands provided synthetic receptors that are among the most advanced models for enzyme behavior. Elusive intermediates of carbonyl addition reactions – hemiaminals, hemiacetals and hemiketals –

show amplified concentrations and protracted lifetimes in these cavitands, and can be directly observed by conventional spectroscopy, such as NMR. Catalysis of epoxide reactions reveals that the restricted environments channel the reactions in cavitands along a specific path, thereby strengthening the parallels with enzymes (*Science* 2007, *317*, 493; *J. Am. Chem. Soc.* 2007, *129*, 15330). In some cases, enviable rate enhancements (> 10^5) were observed. He recently reported innovative, reversible on/off switching of the binding to these cavitands through light irradiation or metal ion coordination (*Angew. Chem. Int. Ed.* 2010, *49*, 3189).

Julius Rebek is one of the most creative and most accomplished contemporary chemists worldwide. His leadership extends far beyond molecular recognition and supramolecular chemistry. Concepts abundantly demonstrated in his work, such as template catalysis, H-bonding self-assembly, and stereoselective molecular recognition increasingly fertilize new developments in synthetic methodology, as illustrated for example by the work of T. Bach at the TU Munich. His scientific work has always been ahead of its time and continues to profoundly impact future generations of scientists.

Rebek has held many name lectureships worldwide and won numerous awards such as the Cope Scholar Award (1991), the James Flack Norris Award (1997), and the Ronald Breslow Award for Achievement in Biomimetic Chemistry of the ACS (2004); he is also a member of the US National Academy of Sciences and the American Academy of Arts and Sciences. In 2012, he received the highest honor in Chemistry at ETH Zurich, the Prelog Gold Medal. His towering research achievements have profoundly influenced contemporary organic chemistry over more than three decades. In addition, he has positively influenced chemistry developments at Castellón. Therefore, Julius Rebek is an outstanding candidate for a honorary doctoral degree from the University Jaume I of Castellón and I give him my highest recommendations for this most-deserved honor.

Sincerely yours



François Diederich

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Bonn, den 29. Oktober 2014

Subject: Support to award Honoris Causa degree to Prof. Julius Rebek

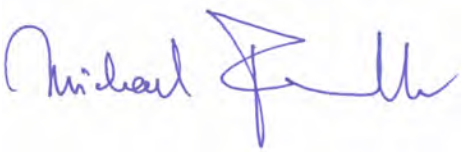
Dear Professor Luis,

with this letter I would like to strongly support the award of the Honoris Causa degree by the University Jaume I of Castellón, Spain, to Prof. Dr. Julius Rebek, Skaggs Institute of Chemical Biology, La Jolla, USA, to recognize his research achievements in the field of chemistry. I support awarding Prof. Rebek with this high honor for several reasons: Prof. Rebek is among the worldwide leaders in the continuously highly topical field of supramolecular chemistry. This field of research has many facets and today it is merging into the so-called ‚systems chemistry' topic. Rebek's chemistry was and still is at the forefont of research. Rebek not only has massively helped shaping this important research field, he also has had an extensive impact on chemistry in Spain during the past three decades by continuously hosting and educating highly talented junior researchers from Spain. His successful commitment to developing groundbreaking ideas and concepts and to realize them experimentally over and over again is a tenor that has been adapted by many of his scholars. It is not surprising that several former Rebek-postdocs, inspired by this approach, have become prominent Professors in Spain. In fact, these are also the main reasons why the University of Bonn in Germany has awarded a honorary doctoral degree to Prof. Rebek on April 23rd, 2010.

Regarding his contributions to Chemistry in the past decades I would like to briefly mention only some of the highlights in the form of keywords: experimental systems for proving the Pauling-

principle of enzymology: catalysis by maximaum binding of transition states, allosteric cooperativity, molecular recognition systems based on Kemp's triacid, autocatalysis and self-replication, and self-assembling molecular capsules and molecular machines. All these groundbreaking contributions were published in the best magazines, among them Nature, Science, J. Am. Chem. Soc. and Angew. Chem. His work has already earned him many awards and honors.
By awarding the Honoris Causa degree by the University Jaume I of Castellón to Prof. Dr. Julius Rebek to recognize his research achievements in the field of chemistry, a true pioneer in a highly timely field of Chemistry would be honored. Again, I give my warmest, and most enthusiastic support for this nomination.

With kind regards,
Sincerely,



Prof. Dr. Michael Famulok

UNIVERSITÄT
DUISBURG
ESSEN

Campus Essen, Fakultät für Chemie
Institut für Organische Chemie

Prof. Dr. Gebhard Haberhauer

Universität Duisburg-Essen • Fakultät für Chemie • 45117 Essen

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Gebäude: Universitätsstraße 7, S07 S05 C39

9. November 2014

Letter of support for Prof. Dr. Julius Rebek, Jr.

Dear Members of the Committee,

I am very pleased to write a letter of support for Prof. Dr. Julius Rebek, Jr. on behalf of Prof. Dr. Santiago V. Luis who started the administrative process to award Prof. Dr. Julius Rebek, Jr. the Honoris Causa degree by the University Jaume I of Castellón.

Julius Rebek is without any doubt one of the most prestigious chemist in the area of supramolecular chemistry. During the last 30 years he has left his mark on this area like almost no other researcher. A variety of achievements, concepts and principles of modern supramolecular chemistry are based on knowledge, ideas and results achieved in his research laboratories. Without his contributions our insight in supramolecular chemistry would be substantially poorer.

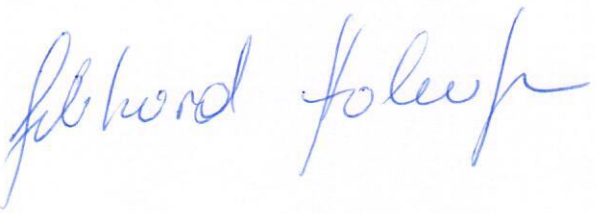
From the many results of his research, I would like to highlight the following examples. With his work on bipyridines and its metal complexes he was one of the first to use mechanical movements on molecular level to obtain changes in the form of the molecules and thus in their reactivity. Still nowadays his bipyridine rotor system is used in many laboratories of other research groups as central rotor unit for the construction of complex molecular motors and machines.
The areas where he left his imprints as no other are artificial self-replication and artificial self assembly. He was the first to synthesize an artificial molecule which - based on molecular recognition and self-complimentary - is a self-replicating system. He was a pioneer in the area of artificial self assembling showing the impressed chemical community that he was able to create artificial systems capable of self assembling by hydrogen bonds. The latter process leads to dimers showing a distinct cavity. Depending on the starting molecules the self-assembled capsules show different size, different shapes, different stabilities and include guests of distinct properties such as shape, size and form.

Depending on the size of these self-assembled capsules he called them tennis ball, softball, football, volleyball and so on. These names are now established terms in standard chemistry textbooks. Again and again he surprises the chemical community with astonishing effects based on the chemistry of self assembling in such different areas as catalysis, inhibition of highly reactive reagents and molecular processes in compressed systems.

His amazing scientific discoveries have not only thrilled the chemical community, but have also interested a broad audience. Especially the fact that humans are capable to create superior systems which can control and manipulate other subsystems and processes shows that Julius Rebek is one of the most brilliant chemists of our times.
The fascination emanating from the control of complex chemical processes has inspired a multitude of young researchers working in his laboratories like me to pursue an academic career. His influence on chemistry and especially on supramolecular chemistry is unique.

Due to his invaluable inspiration and merits he earned numerous highly reputable international awards and prizes during the last years.
In short, I pay special tribute to Julius Rebek and I highly recommend the committee to award him the Honoris Causa degree.

Best regards,



Prof. Dr. Gebhard Haberhauer

The General Secretariat
University Jaume I
Avda Sos Baynat s/n
E-12071-Castellon, Spain

Subject: Nomination of Julius Rebek 29 November, 2014

Dear General Secretary:

It is my pleasure to nominate **Prof. Julius Rebek, Jr.** for the ***Honoris Causa Doctoral degree*** *to recognize research achievement in the field of chemistry.* This very high honor is appropriate for Rebek as he has introduced several ideas that broadened organic chemistry during his career, and his record of intellectual creativity is widely recognized. Rebek's target structures result from personal design and have resulted in a new hierarchy of beautiful and functional molecules. These are not simply exercises in esoteric elegance, they represent the synthetic organic structures which are molecular devices: some were the first to demonstratie allosteric behavior and molecular replication; some show unmatched molecular recognition properties; and some self-assemble to give functional cavitands and capsules. The ideas on how to molecules accomplish these feats have stimulated a whole generation of organic chemists to undertake ventures in creative designs of molecular devices from first principles.

One of the notable projects, open-ended vessels called functional deep cavitands were created by Rebek over the last decade and applied to problems in mechanistic organic chemistry. These have shown enormous ($>10^5$) rate enhancements in catalysis, isolation and direct observation of reactive intermediates such as hemiaminals and carboxyl activation (through isonitriles and carbodiimides). The capsules and cavitands represent the leading edge of techniques for determining weak intermolecular forces and channeling reactions along previously unknown pathways. Ironically, these confined compartments provide elegant solutions to old problems posed by the vast spaces of solution chemistry, but it required Rebek's ingenuity to find the right place to look. The

architectures have an Escher-like quality, in which the atoms and the spaces they define are inextricably linked. Some 20 research groups world-wide are now using reversible encapsulation phenomena to explore molecular behavior at extremely close range.

In summary, Rebek has consistently introduced unique departures from mainstream chemistry research, where the design and synthesis of new systems and structures are applied to produce chemical functions. These established his reputation as thinker who makes quantum leaps instead of incremental steps. For these inventions and devices, I believe that the jury, after assessing the creative and numerous contributions to organic chemistry, will see Julius Rebek as the compelling choice for the next ***Honoris Causa Doctoral degree.***

Sincerely,

Takeharu Haino, PhD
Professor of Chemistry, Graduate School of Science,
Hiroshima University

UCLA
DEPARTMENT OF CHEMISTRY
AND BIOCHEMISTRY

KENDALL N. HOUK
Distinguished Professor
Saul Winstein Chair in Organic Chemistry

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phone: 310-206-0515
fax: 310-206-1843
houk@chem.ucla.edu

Oct. 21, 2014

Professor Santiago V. Luis
Department of Inorganic and Organic Chemistry
Supramolecular and Sustainable Chemistry Group
University Jaume I
Avda Sos Baynat s/n
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Spain
luiss@uji.es

Dear Professor Luis:

I wish to support the nomination of Professor Julius Rebek of the Scripps Research Institute for the degree of Honoris Causa.

Rebek thinks of exceedingly clever ways to demonstrate the complexities of nature on a small scale: the three-phase test, molecular devices like levers and cooperative binders, self-replicating molecules, confronted difunctional receptors, and now reactions in the "inner phase" of hemicarceplexes. The genius of Rebek is his fabulous conceptualization combined with the ability to figure out how to demonstrate the concept. He gives superb lectures, weaving a story of chemical adventure and enlightenment. He is universally considered by chemists as one of the special minds of our field – special on the genius side!

Rebek and I were colleagues at the University of Pittsburgh – no more creative or stimulating colleague can be imagined. He has touched many areas of organic chemistry and chemical biology and has become the world leader in host-guest and container molecules.

Julius Rebek was chosen as our first Winstein lecturer at UCLA thirteen years ago, because Rebek – like Winstein in the 50s and 60s – exemplifies the forefront of physical organic chemistry – combining synthetic skills and physical chemical methods to explore the fundamentals of molecular interactions. His chemistry also mimics

biology, and the understanding resulting from his studies may be used some day to influence biology.

He recently uncovered new behaviors of hydrocarbons upon molecular encapsulation. These phenomena were unknown in bulk solution or typical liquid phases but are intrinsic behaviors; they appear only when hydrocarbons are confined in very small spaces. The ability of hydrocarbon molecules to adapt their shapes to their containers helped define the "55% rule" for reversible encapsulation.

Rebek led science in what has now been dubbed by others as mechanochemistry, and now he leads the world in exploring chemistry occurring inside molecules. He is a leading creator in science and deserves the degree of Honoris Causa.

Sincerely yours,

K. N. Houk
Saul Winstein Professor in
Organic Chemistry

KNH/ls

Departamento de Química
Orgánica e Inorgánica
Universidad de Oviedo

ASTURIAS
CAMPUS DE EXCELENCIA
INTERNACIONAL
AD FUTURUM

Oviedo, 5 de Noviembre de 2014

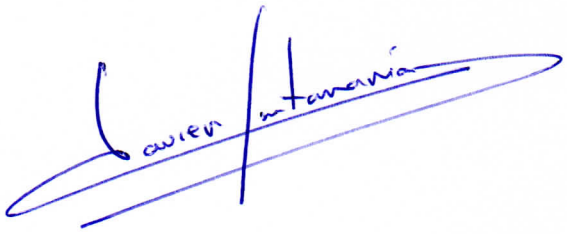
Es para mí un honor y un placer apoyar la candidatura del profesor Julius Rebek, Jr. como "Doctor Honoris Causa" por la Universitat Jaume I de Castellón.

Considero al profesor Rebek como uno de los pioneros, a nivel mundial, en el campo de la Química Supramolecular moderna y más concretamente en el del reconocimiento molecular. Entre los diferentes temas abordados a lo largo de su exitosa carrera investigadora destacaría la síntesis de sistemas autorreplicantes o el desarrollo del autoemsamblaje de moléculas o "Self-Assembling" así como el estudio del comportamiento de moléculas en espacios reducidos. Su dilatada y brillante carrera, primeramente en la Universidad de Pittsburg, posteriormente en el MIT (Massachussets Institute of Technology) y actualmente en The Scripps Reserarch Institute en La Jolla, San Diego, California, así lo atestigua. Además, desde 1996, año de su fundación, es director de The Skaggs Institute for Chemical Biology donde ha sabido gestionar un importante patrimonio económico convirtiendo dicha institución en un referente a nivel mundial con una producción de más de trescientas publicaciones científicas anuales.

El profesor Rebek es autor de más de 500 publicaciones científicas y de un buen número de patentes, habiendo recibido innumerables premios a nivel internacional.

Como persona que, siendo estudiante postdoctoral en su grupo en The Scripps Research Institute (1997-1999), ha conocido desde dentro el trabajo y la dedicación del profesor Rebek a la química, en la frontera con la biología, acepto gustosamente el ofrecimiento que se me hace apoyando de forma entusiasta su candidatura a "Doctor Honoris Causa" por la Universitat Jaume I de Castellón.

Atentamente,



Javier Santamaría Victorero

Profesor Titular del Departamento de Química Orgánica e Inorgánica

Universidad de Oviedo.-

TECHNISCHE UNIVERSITÄT
KAISERSLAUTERN

Prof. Dr. Stefan Kubik

Fachbereich Chemie
Organische Chemie

Erwin-Schrödinger-Straße
D-67663 Kaiserslautern

Letter of support for Prof. Julius Rebek Jr. to receive the Honoris Causa degree by the University Jaume I of Castellón

To whom it may concern

I am writing this letter to express my strong support of awarding Prof. Julius Rebek Jr. the Honoris Causa degree by the University Jaume I of Castellón.

Prof. Rebek was born in Hungary in 1944. His family moved to the U.S. in 1949 where he grew up and received his education. He did his undergraduate studies at the University of Kansas and then moved to the Massachusetts Institute of Technology (M.I.T.) for his PhD, which he obtained in 1970 for studies in peptide chemistry with Prof. Kemp. He then became Assistant Professor at UCLA. During his time in Los Angeles he developed the "three-phase test" for reactive intermediates. This technique involves release of a reactive intermediate from an insoluble solid support and the trapping of this intermediate by a second support suspended in the same reaction mixture. Detection of the expected product on the second support lends strong support to the existence of the free intermediate in solution. This method was, for example, used to demonstrate the non-negligible life-time of free cyclobutadiene.

Prof. Rebek's research interests then shifted to Supramolecular Chemistry, a scientific field that started to develop at the end of the 1970s with the work of Pedersen, Lehn, and Cram. With his move to the University of Pittsburgh, where he became Professor of Chemistry, Prof. Rebek started to contribute with highly original work on cleft-like structures to this blossoming field, which was at that time dominated by the development of macrocyclic receptors. He showed that, with the appropriate preorganization, also non-cyclic receptors are able to strongly and selectively bind to appropriate guests. These receptors progressively became structurally more and more elaborate allowing, for example, also the binding of bio-relevant substrates such as nucleobases or nucleotides. In addition, Rebek's receptors served as model compounds to evaluate in detail principles of molecular recognition phenomena such as the contribution of hydrogen-bonding and aromatic interactions to the stability of the DNA double helix. Interestingly, many receptors developed at that time contain a cyclohexane-derived tricarboxylate as the core structure, a compound originally introduced by D. S. Kemp and therefore named by Prof. Rebek in honor of his PhD supervisor "Kemp's triacid".

In 1989 Prof. Rebek returned to the M.I.T. as Camille Dreyfus Professor of Chemistry. During the first years at M.I.T. he became most famous for his ground-breaking work on synthetic molecules that are able to catalyze their own synthesis, so-called self-replicating molecules. Not only did Prof. Rebek's group show that, based on the principles of Supramolecular Chemistry, completely abiotic

compounds can be devised that mimic the behavior of structurally much more complex natural counterparts, these compounds also allowed the Rebek group to demonstrate basic principles of chemical evolution such as mutation and selection.

Some years later the work of the group shifted focus to the development of self-assembling molecular capsules. The first report in this context about the so-called molecular "tennis-ball" was published in 1994 and received huge attention, including from the general press. While applications of such self-assembling capsules were still far away, the work showed that the correct molecular design could yield compounds whose shape and hydrogen-bonding pattern allows them to self-assemble and enclose a space of well-defined size, similar as the proteins that make up the outer coatings of viruses. This initial paper started a new field within Supramolecular Chemistry to which the Rebek group continues to contribute with highly original work until today. After moving to the Scripps Research Institute to become the Director of The Skaggs Institute for Chemical Biology, Prof. Rebek mainly focused research on this area. More recently, he started to use the knowledge thus gained to tackle more applied aspects such as the detection and detoxification of chemical warfare agents.

With more than 600 papers published and an h-index of currently 82 Prof. Rebek can certainly be considered as one of the leaders in his research field. His original and highly creative work has initiated research directions (self-assembly, molecular capsules, self-replication) that are nowadays closely associated with his name. His reputation is also reflected in the numerous scientific awards he has received including the A. C. Cope Scholar Award (1991), the NIH Merit Award (1996), the James Flack Norris Award in Physical Organic Chemistry (ACS, 1997), the American Institute of Chemists, Chemical Pioneer Award (2002), and the Ronald Breslow Award for Achievement in Biomimetic Chemistry (ACS, 2004).

I, myself, had the honor and pleasure to work with Prof. Rebek as a post-doc between 1993 and 1994 when he was still at M.I.T. My first meeting with him was in his office where he, casually dressed, welcomed me into his group, introduced me to the project I was supposed to work on, and emphasized that he would allow me every freedom not only to pursue my own project, but also other projects during my stay. By allowing all of his co-workers this freedom Prof. Rebek succeeded in establishing an atmosphere in his group that was dominated by mutual trust, team spirit and scientific creativity. When in 1994 the paper about the molecular "tennis-ball" appeared everybody in the group thought about analogous potentially self-assembling systems that could give rise to new molecular capsules with cavities larger than that of the "tennis-ball". In this context, the molecular "soft-ball" and "doughnut" were devised, for example. We all saw the potential of this field and tried to move further. Prof. Rebek was always there to support and gently guide us, and I strongly believe that the overall quality of the scientific output of his group throughout the years benefitted from his ability and interest to maintain a creative and collaborative atmosphere among his co-workers.

His respect for the people working for him and his scientific support is likely the reason why so many of his co-workers stayed in academia after finishing PhD or post-doc. As a consequence, an exceptionally large world-wide academic community of former members of the Rebek group developed over the years. In Germany alone at least seven of his former co-workers successfully

found positions in academia, and this situation in other countries including Spain is similar. It is therefore not only the research of Prof. Rebek that renders him an outstanding scientist. Also the numerous people who worked with him and were profoundly influenced by his knowledge, ideas, and friendship and inspired to continue contributing to research, often in Supramolecular Chemistry but also in other areas of Chemistry, can be regarded as his legacy.

Concluding, I cannot think of a better scientist in the area of Supramolecular Chemistry or a better person to award the Honoris Causa degree by the University Jaume I of Castellón than Julius Rebek.

Kaiserslautern, 29.10.2014

Prof. Dr. Stefan Kubik

Prof. José Luis Mascareñas
Presidente del Grupo Especializado de Química Biológica - RSEQ

Centro Singular de Investigación en Química Biológica y Materiales Moleculares (CIQUS)
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E-mail: joseluis.mascarenas@usc.es

Santiago de Compostela, 28 Octubre 2014

Es un placer para mí el apoyar el nombramiento del Profesor Julius Rebek, Director del Skaggs Institute for Chemical Biology como Doctor Honoris Causa por la Universidad Jaume I de Castellón.

El Profesor Rebek ha realizado numerosas contribuciones científicas al más alto nivel cuya calidad y relevancia justifican con claridad este nombramiento. La carrera científica del Dr. Rebek se ha desarrollado en las áreas de Química Orgánica Física, Química Supramolecular y Química Biológica. En mi caso, resultan especialmente relevantes sus aportaciones en el campo de la Química Biológica, tal como queda manifestado por la importancia del puesto desempeñado, como Director del Instituto Skaggs de Biología Química, en uno de los centros de investigación, el Instituto Scripps, más importantes en la actualidad.

El Dr. Rebek realizó su tesis doctoral en el MIT en 1970, en el campo de la química de péptidos, bajo la dirección del Dr. Kemp, e inmediatamente comenzó su Carrera como investigador independiente en la UCLA donde fue Assistant Professor entre 1970 y 1976. Durante este periodo en UCLA realizó distintas aportaciones en el campo del estudio de intermedios de reacción (con el diseño del denominado test de las tres fases) y comenzó su andadura en el campo de la Química Supramolecular con el desarrollo y estudio de distintos receptores de tipo éter corona. Esta actividad investigadora se mantuvo después de su traslado a la Universidad de Pittsburgh donde completó el desarrollo de receptores de tipo éter corona como modelos sintéticos del comportamiento alostérico de sistemas biológicos como la hemoglobina. La capacidad de definir receptores sintéticos capaces de llevar a cabo procesos de reconocimiento receptor-sustrato regulados mediante estímulos externos, permitió al Prof. Rebek obtener alguno de los primeros ejemplos de lo que hoy se denominan máquinas moleculares y que representan un campo de creciente interés actual. En paralelo con esta línea de trabajo, la investigación realizada en la Universidad de Pittsburgh permitió desarrollas otras líneas también de una elevada relevancia en el campo de la Química Biológica. La primera de ellas fue el desarrollo de receptores preorganizados tridimensionalmente de manera que generaban una cavidad abierta con una estructura estereoelectrónica perfectamente definida (cleft-like molecules) lo que permitió el desarrollo de una Química Supramolecular extraordinariamente interesante. En 1989, el Dr. Rebek volvió al centro donde había realizado su tesis doctoral, el MIT, donde continuó completando esta línea de investigación y donde realizó otra de sus aportaciones más notables como fue la creación de sistemas abióticos, puramente sintéticos, no basados en los elementos biológicos tradicionales, capaces de autoreplicarse. También en el MIT comenzó a elaborar una nueva contribución de alta relevancia como fue el estudio de cápsulas moleculares autoensambladas capaces de generar una cavidad interior en la que hospedar de manera selectiva diferentes moléculas, pudiendo incluso modificar los parámetros tradicionales de reactividad química, de un modo claramente inspirado en la estructura de los sistemas enzimáticos. Esta ha sido una de las líneas

Prof. José Luis Mascareñas
Presidente del Grupo Especializado de Química Biológica - RSEQ

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de actuación fundamentales desarrollada por el Prof. Rebek después de su traslado al Instituto Scripps, donde ha sido, desde 1996, director del Instituto Skaggs.

Finalmente, me gustaría destacar la labor formadora del Dr. Rebek, en particular en lo que se refiere a la formación de investigadores postdoctorales que, en muchos casos, han sido capaces de desarrollar posteriormente una carrera científica muy brillante, tanto en Norteamérica como en Asia o Europa. De especial relevancia en este apartado es la influencia del Dr. Rebek en España, habiendo contribuido a la formación de un numeroso grupo de investidadores españoles desde sus primeras etapas en UCLA. Hoy en día, son varios los grupos de investigación españoles, con proyectos de investigación de alta calidad en marcha que directa o indirectamente puede considerarse que se han formado con el Dr. Rebek.

Por todo ello, considero que la concesión al Dr. Julius Rebek del Doctorado Honoris Causa por la Universidad de Castellón, está sobradamente justificada

Fdo: José Luis Mascareñas
Presidente del Grupo Especializado de Química Biológica- RSEQ y Director Científico del CIQUS

Prof. Dr. Dr. h.c. Nazario Martín, FRSC
Full Professor of Organic Chemistry
Past-President of The Spanish Royal Society of Chemistry
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_____
DEPARTAMENTO DE QUIMICA ORGANICA
FACULTAD DE CIENCIAS QUIMICAS
UNIVERSIDAD COMPLUTENSE DE MADRID
28040 MADRID, SPAIN

Madrid, October 25, 2014

To whom it may concern,

It is a great pleasure for me to write this letter supporting Professor Julius Rebek Jr. as one of the most important scientists who has developed a variety of important concepts and areas in chemistry along the last decades to be appointed as Doctor honoris causa by the University Jaime I of Castellón.

Prof. Rebek has accomplished one of the most brilliant academic careers ever seen in chemical research, in particular, in the so-called "Supramolecular Chemistry".

His scientific work can be considered as exceptional, having created a recognized research group and being one of the pioneers and world leaders in his scientific area. Actually, he has been the Director of The Skaggs Institute for Chemical Biology and Professor of Chemistry at Department of Chemistry in The Scripps Research Institute. Only talented and exceptional scientists are able to get such position in one of the leader scientific centers all over the world.

Educated at the University of Kansas and Doctor by the Massachusetts Institute of Technology (MIT) in 1970, he moved to UCLA and later as Professor to University of Pittsburg where he started his works on molecular recognition.

In 1989 he returned to the MIT, where he was appointed Camille Dreyfus Professor of Chemistry and devised synthetic, self-replicating molecules. In July of 1996, he moved to The Scripps Research Institute to become the Director of The Skaggs Institute for Chemical Biology, where he continues to work in self-assembling systems and the sensing and destruction of nerve agents. Last November 2013 he opened a laboratory in the Chemistry Department of Fudan University, Shanghai, China as a Visiting Professor under the 1000 Talents Program.

The aforementioned scientific career has resulted in over 500 scientific papers and conferences in the most prestigious research centers, universities and international congresses. Actually, his name is already written in the history of Supramolecular Chemistry as one of the most brilliant scientists whose work is considered as an international reference.

In summary, based on his creativity and imagination he has been able to develop a new chemistry with far-reaching fundamental and practical consequences. Therefore, I do not hesitate to support Prof. Rebek as an appropriate and best candidate to receive the appointment of Doctor honoris causa by the prestigious University Jaime I of Castellón.

Prof. Nazario Martín

UNIVERSITY OF CALIFORNIA, IRVINE

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James S. Nowick
Professor of Chemistry
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November 9, 2014

Santiago V. Luis
Dpt. of Inorganic and Organic Chemistry
Supramolecular and Sustainable Chemistry Group
University Jaume I
Avda Sos Baynat s/n
E-12071-Castellon. Spain
luiss@uji.es

Dear Dr. Luis,

Kudos to you and to the University Jaume I for having the vision to nominate Professor Julius Rebek for the Honoris Causa degree. Julius is a world leader in supramolecular chemistry who has trained and mentored generations of academic scientists, including many from Spain. He is a superb mentor, scholar, and scientist. He has received the American Chemical Society's highest honors in Physical Organic Chemistry (the James Flack Norris Award in Physical Organic Chemistry), Biomimetic Chemistry (the Ronald Breslow Award for Achievement in Biomimetic Chemistry), as well as many other US and European awards. He is a member of the National Academy of Sciences and a Fellow of the American Academy of Arts and Sciences, two honors reserved for the very top echelon of US scientists. He has a deep love of the both the science and the culture of Spain and will be deeply honored to be recognized by your university. I heartily support your awarding him this honor.

Sincerely,

James S. Nowick
Professor of Chemistry

Institut Català d'Investigació Química

Prof. Miquel A. Pericàs
Institute of Chemical Research of Catalonia
Avgda. Països Catalans, 16
43007 Tarragona, Spain
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mapericas@iciq.es

Tarragona, 7 de Noviembre de 2014

Prof. Vicent Climent Jordà
Rector Magnífic de la Universitat Jaume I

Benvolgut Rector,

Assabentat de la proposta de concessió del grau de Doctor *Honoris Causa* al Professor Julius Rebek Jr. per iniciativa del Prof. Santiago V. Luís, catedràtic del Departament de Química Inorgànica i Orgànica de la Universitat Jaume I, vull expressar mitjançant aquest escrit el meu suport més entusiasta i el de la institució que dirigeixo a aquesta iniciativa.

El Professor Rebek, que al llarg de la seva dilatada carrera investigadora ha contribuït a consolidar l'excel·lència investigadora d'un gran nombre de Professors d'Universitats de l'Estat Espanyol (entre els quals es compta el Prof. Santiago V. Luís), és un dels pares de la moderna química supramolecular. Als inicis de la seva carrera com a Assistant Professor a UCLA va desenvolupar el molt útil i innovador *test de les tres fases* per a la detecció d'intermedis de reacció, en col·laboració amb el prematurament desaparegut Prof. Francisco Gaviña. Més tard, ja com a Professor de Química a la Universitat de Pittsburgh, va desenvolupar molècules en forma de solc (*cleft*) aptes per al reconeixement de ions i de biomolècules no iòniques. El Prof. Santiago V. Luís va tenir una implicació important amb aquest treball.

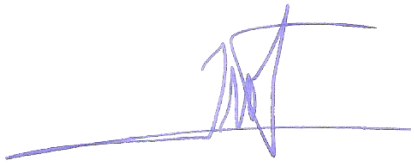
Ja traslladat al MIT, Julius Rebek va continuar fent important aportacions en col·laboració amb investigadors del nostre país. Així, treballant amb el Prof. Pau Ballester va desenvolupar el primer sistema molecular amb capacitat d'autoreplicació, essent aquesta la característica essencial de la *vida*, i, en col·laboració amb el Prof. Javier de Mendoza, va desenvolupar molècules que s'autoensamblen mitjançant enllaços d'hidrogen construint contenidors moleculars.

Arran del seu trasllat al Scripps Research Institute l'any 1996, va esdevenir director del Skaggs Institute for Chemical Biology, i ha continuat desenvolupant la seva recerca i mestratge en els camps del reconeixement molecular i els sistemes auto-assemblables.

El Prof. Rebek ha format part del Scientific Advisory Board de l'Institut Català d'Investigació Química d'ençà de la seva constitució l'any 2002. He tingut oportunitat de compartir amb ell moltes sessions de treball en l'exercici d'aquesta funció, i he pogut comprovar la seva qualitat humana, excel·lència científica i compromís amb la recerca al nostre país.

D'acord amb tot l'anterior vull reiterar-vos, Magnífic Rector, el suport a la concessió del grau de Doctor *Honoris Causa* al Professor Julius Rebek Jr. per part de la Universitat Jaume I.

Rebeu una ben cordial salutació,



Miquel A. Pericàs

Consejo Superior de Investigaciones Científicas

Instituto de Productos Naturales y Agrobiología
Departamento de Química Biológica y Biotecnología

Dr. Tomás Martín Ruiz
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Científico Titular
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Profesor Santiago Vicente Luis Lafuente
Catedrático del Departamento de Química Inorgánica y Orgánica
Universidad Jaume I de Castellón

Estimado Sr.:

He recibido la invitación de sumarme a la iniciativa para proponer el nombramiento del Profesor Doctor Julius Rebek Jr. como Doctor Honoris Causa por la Universidad Jaume I de Castellón.

Conocí al Profesor Julius Rebek Jr. en la XIV Reunión Bienal del Grupo de Química Orgánica celebrado en Palma de Mallorca en abril de 1993. En aquel momento yo estaba realizando mi tesis doctoral, y me quedé fascinado de como algunas moléculas diseñadas por el Profesor Rebek podían auto-replicarse. Posteriormente, una vez finalizada mi tesis doctoral, decidí realizar una estancia post-doctoral durante dos años en el Scripps Research Institute de California bajo su supervisión, y en ese periodo pude comprobar no sólo su excelente valía como científico, sino también como persona.

Sería prácticamente imposible enumerar los méritos científicos del Profesor Rebek, pero sí se puede afirmar con total certeza que es uno de los pioneros en el campo de la Química Supramolecular, y uno de los científicos más brillantes que existen actualmente. Sus aportaciones al reconocimiento molecular, en la auto-replicación de moléculas y en el auto-ensamblaje han sido los pilares fundamentales para el desarrollo actual de este campo.

Como científico titular del Consejo Superior de Investigaciones Científicas es para mí un orgullo y una gran satisfacción manifestar mi pleno respaldo y adhesión a esta propuesta, y al mismo tiempo, quisiera aprovechar la oportunidad para felicitar a los promotores de la misma.

Atentamente,

La Laguna, 30 de noviembre de 2014

Fdo. Dr. Tomás Martín Ruiz

Real Sociedad Española de Química

Facultad de Ciencias Químicas
Universidad Complutense
Ciudad Universitaria
28040 Madrid

Madrid, November 6, 2014

Prof. Julius Rebek, Jr
Doctor Honoris Causa,
Universitat Jaume I

TO WHOM IT MAY CONCERN,

I, the undersigned, as individual scientist in the molecular recognition field, representing the Royal Society of Chemistry of Spain (RSEQ), declare the my enthusiastic support to the candidature of Prof. Julius Rebek as Doctor Honoris Causa by Universitat Jaume I.

His contributions to Science are enormous. His modern vision, his ways of looking at Nature and trying to mimic it by using synthetic molecules are indeed unique. In all the scientific portals it is possible to have a good idea of his achievements. I will just mention some seminal gifts in the molecular recognition field by designing smart molecules that are able to self-replicate, self-assemble, mimic allosteric effects, act as efficient molecular machines and mimic protein surfaces. Any of these individual contributions would make a Giant of Science. Achieving so many of that is simply outstanding.
In my opinion, the visibility of Universitat Jaume I honoring Prof. Rebek would be extremely high.
In this context, I fully support the mentioned initiative.

Yours faithfully,

Prof. Dr. Jesús Jiménez-Barbero
President RSEQ
Chemical & Physical Biology, CIB-CSIC, Head

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MINISTERIO
DE ECONOMIA
Y COMPETITIVIDAD

CSIC
Consejo Superior de Investigaciones Científicas

Barcelona, 27 de Octubre de 2014

Comisión doctorado *Honoris causa*

Universitat Jaume I de Castellón

Estimados Srs,

Es para mi un gran placer escribir esta carta de apoyo a la candidatura del **Prof. Julius Rebek** Jr. para el doctorado *Honoris causa* de Universidad Jaume I de Castellón. Prof. Rebek es uno de los más prestigiosos investigadores químicos de nuestro tiempo. Este investigador es uno de los pioneros del campo del reconocimiento molecular y de los sistemas autoreplicativos. Prof. Rebek ha desarrollado numerosos sistemas de reconocimiento molecular incluyendo moléculas con cavidades en su estructura que unen moléculas iónicas por interacciones electroestáticas así como moléculas no iónicas mediante interacciones de puente de hidrógeno e interacciones hidrofóbicas. También ha diseñado las primeras moléculas capaces de generar movimiento mediante cambios de afinidad en diferentes sitios de la molécula. Finalmente el Prof. Rebek es uno de los pioneros en el diseño de moléculas que son capaces de catalizar su propia síntesis como resultado de su autoasociación.

Prof. Rebek es coautor de más de 500 artículos, la mayoría de ellos publicados en revistas internacionales de gran prestigio. Estas publicaciones han generado más de 21000 citaciones consiguiendo un índice de Hirsch de más de 80. El Prof. Rebek ha recibido un gran número de premios y reconocimientos por su gran actividad investigadora entre los cuales podemos destacar las nominaciones como miembro de las Academias de Ciencias de America (1993) y de Europa (2005), el "NIH merit Award" (1996), el "James Flack Norris Award" (1997), el "Chemical Pioneer Award" (2002), el "Ronald Breslow Award" (2004), y el "Evans Award" (2006).

Además el Prof. Rebek ha sido extraordinariamente activo en la formación de nuevos investigadores atendiendo a más de 150 colaboradores entre estudiantes de doctorado e investigadores postdoctorales.

Por todo ello, quiero expresar mi apoyo y el del resto de los investigadores del IQAC en la candidatura del Prof. Rebek para el doctorado *Honoris causa* de Universidad Jaume I de Castellón.

iQAC
INSTITUTO DE QUÍMICA AVANZADA DE CATALUÑA

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MINISTERIO
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Atentamente,

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Goessmann Professor
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November 1, 2014

Dear Sir/Madam,

It is my pleasure to recommend Hedi Rebek for recognition as Honoris Causa degree by University Jaume I of Castellón, Spain. Over the course of his career, Professor Rebek has been a true pioneer, being one of the leading forces in the development of supramolecular chemistry. This letter will focus on the tremendous strides he has made scientifically, and not the numerous awards and honors he has received.

Of the 499 papers published/in press by Prof. Rebek, most are in high-impact journals including a staggering 11 in *Science*, 5 in Nature, 172 *in Journal of the American Chemical Society* and 31 in *Angewandte Chemie*. and *Nature Protocols*, and two each in *Nano Letters* and. *Proceedings of the National Academy of Science.* Individually, his papers have generated substantial interest, with 61 having over 100 citations. Collectively, the impact of these publications is truly impressive; his papers have received almost 25,000 citations to date..

Building upon a strong start in the area of physical organic chemistry, Prof. Rebek has created a groundbreaking program in molecular recognition. This research has changed the way we approach science, starting with his fundamental study of host-guest chemistry in the 1980's. This research led to his pursuit of self-replicatiing systems, where his demonstration of the ability of synthetic systems to replicate a fundamental life process sparked imagination both in the scientific community and beyond.

His greatest influence has perhaps been in the area of container molecule, i.e. host guest systems designed to tightly encapsulate guest molecules. This research is truly impressive, using sophisticated and elegant strategies to design and build the required large hollow host molecules. Using these as a starting point, he elucidated a wide range of fascinating behavior found in constrained systems. These behaviors include catalysis, self-sorting, and protection from environments. He also was able to look carefully at the energetics of the binding process, including his "55%" solution, namely that hosts will typically take up 55% of cavity space based on van der Wal radii.

Overall, Prof. Rebek is a true rarity-someone who is in great part responsible for the creation of a field. Prof. Rebek, along with other researchers including Lehn, Hamilton and de Mendoza defined the field of supramolecular chemistry, with prof. Rebek leading the area to fertile new ground over the course of over three decades. Based the scientific impact he has made, I strongly feel that Prof. Rebek would be an exceptionally suitable candidate for the Honoris Causa degree by University Jaume I of Castellón, Spain.

Sincerely,

Vincent Rotello
Charles A. Goessmann Professor of Chemistry

THE UNIVERSITY of WISCONSIN MADISON

Sandro Mecozzi, Ph.D.
Associate Professor of
Pharmaceutical Sciences and Chemistry

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Prof. Santiago V. Luis
Dpt. of Inorganic and Organic Chemistry
Supramolecular and Sustainable Chemistry Group
University Jaume I
Avda Sos Baynat s/n
E-12071-Castellon. Spain

November 3, 2014

Dear Prof. Luis,

It is my great pleasure to write a letter of support to award a Honoris Causa degree from the University Jaume I of Castellon to Prof. Julius Rebek, Jr.

Prof. Rebek's research has been at the forefront of molecular recognition and supramolecular chemistry for more than thirty years. I can state without any doubt that Prof. Rebek is the most accomplished scientist in the world in the field of small-molecule recognition and encapsulation through nanoscopic self-assembled molecular containers. Prof. Rebek is the primary author of more than 650 articles, all of them published in excellent journals.

The breadth of the research interests of Prof. Rebek is absolutely astonishing. He has been among the first chemists to recognize the possibility of synthesizing small molecules that could organize themselves in functional ordered aggregates upon self-assembly in either aqueous or organic solvents. These aggregates have the ability of recognizing and/or encapsulating specific molecules, including a variety of organic molecules, with high selectivity and specificity. What makes the research of Prof. Rebek totally unique is that the self-assembled aggregates that he has designed can actually be used to study the dynamics and the properties of the encapsulated molecules.

Thus, in some of his recent research, Prof. Rebek has devised molecular vessels that can encapsulate various hydrocarbons, from something as small as methane to something as big as tetradecane ($C_{14}H_{30}$). A number of really important results were provided by these encapsulation studies. For instance, Prof. Rebek has shown that the molecules of cyclopropane that can be encapsulated in his molecular vessels are at a pressure of 3-400 atmopheres. While

this is a very large pressure to achieve in normal conditions, gaseous cyclopropane could be compressed to this pressure simply by bubbling the gas into a solution of the self-assembled molecular vessels. It is the interaction between the propane molecules and the walls of the molecular container that makes the high pressures possible, rather than the physical strength of the vessel itself. The importance of this discovery is self-evident: It will allow the storage of hydrocarbon gases at very high pressure without any special precaution. In another very important discovery concerning hydrocarbons, Prof. Rebek has shown that a long n-hydrocarbon such as tetradecane will orderly fold on itself when encapsulated inside a molecular container of a specific size. Through this folding process a perfect fitting between the cavity inside the vessel and the hydrocarbon is achieved. When additional molecules that can self-assemble with the original molecular container to yield a longer internal cavity, are added to the solution, the encapsulated hydrocarbon uses the additional space to unfold and once again maximize interactions with the internal walls of the molecular container. These studies can be used for easily obtaining quantitative information on the various folding processes of hydrocarbons in a solvent-excluded environment, something that was impossible to achieve before Prof. Rebek studies.

As an example of very recent research, Prof. Rebek has devised reversible molecular capsules in which dihalides or picolines can be bound and in which the molecular dynamics of the guests can be studied with exquisitely precise detail. This kind of studies allows the perfect dissection of all factors that make recognition between molecules possible.

These are only a few examples taken from an amazingly rich scientific career. The research done in the past by Prof. Rebek on molecular recognition systems and self-replicating molecules is considered as one of the highest achievements of organic chemistry in supramolecular applications.

I cannot think of anyone more deserving a Honoris Causa degree. The University of Jaume I will make an excellent choice in awarding such a degree to Prof. Julius Rebek, Jr. I support this nomination in the strongest possible terms.

Sincerely yours,

Sandro Mecozzi, Ph.D.

University of Wisconsin-Madison School of Pharmacy 777 Highland Ave., Madison, WI 53705

Freie Universität Berlin

Fachbereich Biologie, Chemie, Pharmazie
Institut für Chemie und Biochemie

Prof. Dr. C. A. Schalley FU Berlin, Fachbereich Biologie, Chemie, Pharmazie, Institut für Chemie und Biochemie, Takustr. 3, D-14195 Berlin

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Berlin, Oct 21, 2014

Letter in support of an honorary degree awarded to Prof. Julius Rebek, Jr.

Dear Professor Luis,

it is with great pleasure that I follow your request to provide a statement on the achievements of Prof. Julius Rebek from The Scripps Research Institute, La Jolla, California. He is certainly one of the very few worldwide leading and outstanding supramolecular and bioorganic chemists. This is evidenced by his close to 600 scientific publications, many of which appeared in the most prestigious and internationally renowned scientific journals. Among them are 16 Nature and Science publications as well as 50 in Angewandte Chemie, 25 in the Proceedings of the National Academy of Sciences of the USA and more than 170 in the Journal of the American Chemical Society. The impressive number of important honors and awards, Julius Rebek received – among them for example the Arthur C. Scope award of the American Chemical Society – speaks for itself. This picture is similarly supported by the fact that Julius Rebek was appointed member of several scientific academies in the USA as well as in Europe.

Julius Rebek's academic career is flawless and started in 1970 with a Ph.D. with Daniel Kemp at the Massachusetts Institute of Technology. As an assistant professor at the University of Los Angeles Julius Rebek became well renowned for his work in Physical-Organic Chemistry, in particular for the development of the three-phase test for the identification of short-lived and reactive reaction intermediates that are otherwise difficult to detect. After some time at the University of Pittsburgh, where he turned his focus to Supramolecular Chemistry and Molecular Recognition, he was appointed full professor at MIT, where he became the Camille-Dreyfus professor of chemistry in 1991. During his time at MIT, the next truly pioneering work was done: self-replicating molecules. He did not use nucleic acid for this purpose as one might have guessed based on natures use of DNA for replication of the genetic information, but transferred the concept very elegantly to simple synthetic organic minimal models, which contributed significantly to develop our current thoughts on a chemical evolution preceding biological evolution. In 1996, Julius Rebek moved to The Scripps Research Institute in La Jolla, where he was appointed the founding director of the Skaggs Institute for Chemical Biology. His research program on self-assembling, hydrogen-bonded capsules, which he already began at MIT matures here to full bloom. The activities on molecular capsules go far beyond the usual when depth and scope are concerned and – with catalysis in confined spaces and the stabilization of reactive intermediates inside the capsules – closes the circle to Julius Rebek's beginnings in Physical Organic Chemistry.

His activities in the field of supramolecular chemistry have enormous appeal and have inspired many other researchers worldwide: Prof. Jerry Atwood (Missouri, Columbia), Prof. Kari Rissanen (Jyväskylä, Finnland), Prof. Yoram Cohen (Tel Aviv, Israel), Prof. Francois Diederich (Zürich, Schweiz), Prof. Javier de Mendoza (Tarragona, Spanien), Prof. David Reinhoudt (Twente, Niederlande), Dr. Volker Böhmer (Mainz) and certainly many more were prompted by Julius Rebek's work to design, synthesize and investigate molecular capsules. This is also documented by the almost 25.000 citations his work obtained from other researchers' work. But he had more impact internationally than just by his work and his publications. Numerous of his coworkers have decided to follow an academic career in the USA, in Germany and certainly also in Spain and other countries. In Germany alone, I know seven professors who did postdoctoral work in the Rebek group and in Spain I know three. There may well be more than that.

To conclude, Julius Rebek is an absolutely outstanding, extremely inspiring scientist who put his stamp on the field of supramolecular chemistry like only very few others. He has had an impact internationally on the academic world which is far beyond that of most other researchers in academia. I can only strongly support without the slightest hesitation to honor him with an honorary degree.

I hope, I could help you with this short assessment of Julius Rebek's academic achievements. If you have any more questions, please do not hesitate to contact me.

With best regards,

Prof. Christoph Schalley

Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

Fakultät für Chemie und Pharmazie
ORGANISCHE
CHEMIE

Prof. Dr. Frank Würthner

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Professor Santiago V. Luis Lafuentes
Dpt. of Inorganic and Organic Chemistry
University Jaume I
Avda Sos Baynat s/n
E-12071-Castellon
Spain

Würzburg, 25.10.2014

Honoris Causa Degree for Professor Julius Rebek, Jr. at the University Jaume I of Castellón

Dear Professor Santiago Vicente Luis Lafuentes:

It is my great pleasure to support your endeavor to honor Julius Rebek, Jr. with a doctoral honoris causa degree at the University Jaume I of Castellón. The pioneering work of Professor Rebek in hydrogen-bond directed self-assembly is for sure undisputable. It includes the first molecular clefts that mimic biomolecular recognition, the first artificial self-replicators that give a hint onto possible prebiotic replication processes (and maybe even the existence of an early “RNA world”), and the first hydrogen-bonded self-assembled capsules. These breakthrough discoveries, among many others, are indeed such outstanding scientific achievements that I do not feel the need to go more into details (I assume that this has been done by others, in particular by yourself). Also, already a look onto Prof. Rebek´s publication lists shows a researcher whose work has been published extensively in the top journals including *Nature* and *Science*, often even highlighted on the cover.

Therefore I like to add here some thoughts from another perspective which is in my opinion also important for honoring a person with a *honoris causa degree*. In Germany we typically consider persons that in addition to their scientific work also had a particular impact on the development of science in a country or at least for a department. In the case of Prof. Rebek I see a particular impact of his inspiration on the development of Chemistry in two other countries outside the US. One is Spain, the other is Germany. His preference for German postdocs might be somehow related to his family history that had some German-austrian roots (the family left

Hungary after the second world war and moved to the US) or his experience as a young Humboldt fellow in the laboratory of Ivar Ugi at the Technical University of Munich. With regard to his preference for Spanish postdocs I do not know a particular reason. Maybe it had to do with good experience with the first postdoctoral fellows from Spain like you? Irrespective of a particular reason, the number of German and Spanish postdocs that were hosted and educated by Julius Rebek in Pittsburgh, at MIT in Cambridge and at Scripps Institute in La Jolla is just amazing. Our two countries have for sure taken the most benefit of his gratitude and inspiration and a considerable number of former Rebek postdocs are now working at various Universities in our countries. I have myself been a postdoctoral fellow at MIT in 1995/96. Other colleagues of mine include Prof. Michael Famulok (Bonn), Prof. Thomas Carell (Munich), Prof. Siegfried Waldvogel (Mainz), Prof. Stefan Kubik (Kaiserslautern), Prof. Christoph Schalley (Berlin), Prof. Arne Lützen (Bonn), and Prof. Gebhard Haberhauer (Duisburg-Essen). Their work illustrates the influence of Professor Rebek for the development of Bioorganic Chemistry, Supramolecular Chemistry and Materials Chemistry in a formidable way. His important influence for Chemistry in Germany was honored by the University of Bonn with a doctoral honoris causa degree in 2010 and also by the Humboldt foundation with a Humboldt Research Award in 2008. Because his influence on the development of Chemistry in Spain was at least of equal importance I consider Prof. Julius Rebek as a superb choice to receive a honoris cause degree at your University.

Sincerely,

Frank Würthner
Chair of Organic Chemistry II &
Director of the Center for Nanosystems Chemistry

Puducherry, November 9th, 2014

Institut de Chimie des Substances Naturelles

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UPR 2301

Object : Support Letter for the award of the Honoris Causa degree of University Jaume I of Castellón to Prof. **Julius Rebek, Jr**.

Is chemistry Art or Science ?
I remember being a young student and listening to an introductory lecture on chemistry by Professor Pierre Sinaÿ.
The aim of this presentation was to convince us to join the Chemistry Departement at the Ecole Normale Supérieure in Paris, and to do that he showed us molecules from the group of Professor Julius Rebek, that where able catalyze their own formation from smaller parts, and replicate via molecular recognition.
A few years later, I joigned the group of Prof. Rebek for a post-doctoral stay. This was a very inspiring and motivating time, and I learned a lot from Julius, both from a scientific and a human point of view. His scientific achievements are numerous, and still his way to manage a research group, to connect with his collaborators and build friendly relationships that last long after they left the group, makes him a very supportive advisor.
For this, I believe Julius Rebek, Jr. strongly deserves to be awarded the Honoris Causa degree by University Jaume I of Castellón.
The contribution of Professor Rebek to modern chemistry is too vast to be summarized in this letter, but one could mention the three-phase test to detect reactive intermediates, some excursions in total synthesis of bioactive molecules, self-replication, self assembling capsules of various types, sizes and properties, contributions to combinatorial chemistry, protein surface mimetics, uranium ligands, …
Chemistry is Science of course, but not only. The conclusion of Pierre Sinaÿ's presentation was « Chemistry is Art ». And Julius Rebek brought his major contribution.

Dr. Boris Vauzeilles

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Venezia

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To whom it may concern

I write this letter to support the award of the *Honoris Causa* Degree by University Jaume I to Prof. Julius Rebek Jr.

The scientific career of Prof. Rebek started in the early 70's and since then he have been an extremely active, innovative, and ground-breaking scientist for more than 40 years. He has investigated with passion and creativity several fields of chemistry, in particular supramolecular chemistry, catalysis, synthesis of nano-devices to name a few.

As long as his scientific achievements are concerned, Prof. Rebek published about 500 original scientific papers in the most prestigious chemical journals from all around the world, several book chapters in monographs and series published by top publishers and numerous patents. His impressive H-index exceeds 70 indicating the worldwide reputation and the deep impact of his research. Early in his career he investigated peptide synthesis and developed the three-phase test to demonstrate the existence of reactive intermediates. Soon after he started investigating the design and preparation of synthetic self-replicating molecules. The deep knowledge gained in molecular recognition and self-assembly spurred his imagination towards the preparation of self-assembling hydrogen bonded supramolecular capsules of nanometric dimensions. This opened the way to the investigation of the peculiar properties of molecules within molecules with impressive consequences in molecular recognition and supramolecular catalysis.

Personally I have always been impressed by his calm and gentle character, his positive attitude in relating with students, post-docs and collaborators, always leaving high degree of freedom to spur co-workers to grow, innovate and think out of the main stream. In my opinion he has always been able to properly relate with young talented chemistry scientists giving them the balanced input to do their best. Hundreds of PhD students and post-docs that worked in his labs and that contributed to the realization of his scientific achievements are now leading experts in several field of chemistry.

Overall, with the present letter I wish to give my most enthusiastic support to the award of the *Honoris Causa* Degree to Prof. Julius Rebek Jr.

Venice, November 10th, 2014

ALLEGHENY COLLEGE
DEPARTMENT *of* CHEMISTRY
520 North Main Street
Meadville, PA 16335-3902

November 10th, 2014

Dear Members of the Honoris Causa Degree Selection Committee:

I am writing this letter to strongly endorse Professor Julius Rebek, Jr. as a recipient of the Honoris Causa degree at the University Jaume I of Castellón. Professor Rebek has contributed greatly to the Chemistry Field, merging many disciplines over the years with physical organic chemistry. With regard to the accomplishments of Prof. Rebek's research, many important landmark successes that span several decades could be mentioned here and are published in premier journals such as *Nature*, *Science*, *Journal of the American Chemical Society*, and *Angewandte Chemie*. In this letter of support I would like to highlight his recent contributions to the merging fields of molecular recognition with photochemistry, an exciting and untapped area that can now be explored thanks to Rebek's reversible encapsulation complexes.

Our understanding of excited state molecules is still extremely limited in scope, in part due to the many relaxation processes available in dynamic systems. Such processes are often unpredictable, making it challenging to effectively apply photochemistry to important chemistry problems. However, the reversible encapsulation complexes that were discovered by the Rebek lab in the early 1990's offer the Chemistry Field a new tool for studying photochemical behavior and applying photochemistry in a controllable fashion. Rebek capsules surround and protect small chromophoric molecules from solvent and oxygen, and force them in precise geometries that might otherwise only exist in the excited state or never at all. This remarkably unique microenvironment now provides chemists with a previously unattainable situation where excited state molecules can live long enough to be studied, manipulated and tuned. Several important discoveries have recently been reported by the Rebek group in the *Journal of the American Chemical Society*.

The significance of Professor Rebek's encapsulation complexes cannot be understated. They have provided a new tool that unlocks enormous potential for understanding the behavior of excited state molecules in confined spaces. Professor Rebek's contributions to this field and to many others affirm honoring him as a recipient of the Honoris Causa degree. Professor Rebek has my highest recommendation.

Sincerely,

Mark R. Ams

Mark R. Ams, Ph. D.
Assistant Professor of Chemistry
Allegheny College

UNIVERSITY OF OREGON
College of Arts and Sciences DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY

November 13, 2014

Santiago V. Luis
Dpt. of Inorganic and Organic Chemistry
Supramolecular and Sustainable Chemistry Group
University Jaume I
Avda Sos Baynat s/n
E-12071-Castellon. Spain

Dear Santiago,

It is my pleasure to write a letter in strong support of your nomination of Prof. Julius Rebek, Jr. to receive the Honoris Causa degree at your university. He is a world-class scientist, mentor, educator and innovator, and he is highly deserving of such a distinction. I applaud you for your efforts to nominate him for such an honorary degree, and I can think of no one more meritorious in our field to receive such a distinction. He has been a huge supporter to me during my career, first as a researcher when I read his work as a graduate student, then as a post-doctoral researcher under his mentorship where I learned about "modern physical organic chemistry" after receiving my PhD in inorganic chemistry, and finally as an independent faculty member where his tireless support behind the scenes has certainly accelerated my professional development and facilitated my success. I am sure hundreds of his coworkers can provide similar praise.

Prof. Rebek is the rare scientist who has made a profound contribution to a different area of chemistry in each decade of his career. First the "metrics": according to Web of Knowledge, Julius has published over 600 papers, averaged over 550 citations per year throughout his career (over 1200 citations per year in the last 5 years), has been cited nearly 25,000 times and has an astonishing h-index of 82. Julius has been a Chaired professor at MIT, served as Director of the Skaggs Institute for Chemical Biology at the Scripps Research Institute, and is in the process of transitioning to a prestigious directorship at Fudan University in China. Among his many awards, he is a member of the U.S. National Academy of Sciences.

One of Prof. Rebek's first major discoveries was his development of the "three-phase test" for reactive intermediates in the 70s, which identified a variety of putative reactive intermediates including acyl imidazoles, cyclobutadene, singlet oxygen among many others. He transitioned to the field of supramolecular chemistry and molecular recognition in the 80s, where he led the charge to develop molecules with concave curvature that provide a large surface area to binding other small molecules. Inspired perhaps by his PhD mentor's work (Kemp's triacid), he developed the "Rebek Imide" (coined by a coworker and not embraced in name by him). This compound is a hallmark of molecular recognition studies, which provides

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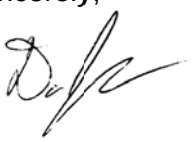
convergence of a number of recognition agents into a single binding site. He culminated these studies in the late 80s and early 90s by moving to a series of synthetic, self-complementary compounds that acted as templates for their own formation, thereby giving rise to self-replicating systems. These studies shed light on complex biological self-replicating systems, but also touch on our innate curiosity concerning origins of life, providing hints that the self-replication principles of the nucleic acids are not the only domain that could support such complexity. While the details of some of this work were controversial and heavily scrutinized at the time, I believe that in each case Rebek's contribution has been vindicated and proven to stand the test of time. In fact, many other researchers in this field (which Rebek has departed), now use the Rebek approach in their own systems.

Finally, in the mid-90s continuing on to this day, Prof. Rebek has harnessed the capabilities of molecular curvature, self-recognition and self-assembly, to form the first hydrogen bonded molecular capsules. These compounds self-assemble from simple monomers into complex three-dimensional "capsules" that are capable of hosting small molecules within their hydrophobic interiors. The initial "tennis ball" and "softball" and then subsequent cylindrical and tetrameric capsules were published in a series of *Science* and *Nature* papers, with their fascinating host-guest properties, guest exchange mechanisms and general ideas on "filling of space" published in numerous papers in *JACS*, *Angew. Chem.*, *PNAS*, etc. Julius is an exceptionally creative scientist, has made profound contributions to science over an illustrious career, has 100s of mentees who are proud to say they have had the privilege of working with him (myself included!), and has made some of the most impactful discoveries in molecular recognition, self-assembly and supramolecular chemistry we have seen. In fact, his work on self-replication and self-assembly are certainly rumored to be in the discussion for receipt of a Nobel Prize in Chemistry someday. I highly recommend Julius Rebek, Jr. for this prestigious honorary degree, and I thank you for taking the initiative to nominate Julius for this distinction, to consider his candidacy, and for the invitation to write a letter in support of such a remarkable scientist.

Sincerely,



Darren Johnson
Professor of Chemistry
Associate Director, Materials Science Institute

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JULIUS REBEK, JR.

Director, The Skaggs Institute for Chemical Biology
and
Professor of Chemistry, Department of Chemistry
The Scripps Research Institute

Biographical Sketch

Julius Rebek, Jr. was born in Hungary in 1944 and lived in Austria from 1945-49. He and his family then settled in the U.S.A. in Kansas where they became naturalized U.S. citizens in 1954. He completed his undergraduate education at the University of Kansas in 1966, and received the Ph.D. degree from the Massachusetts Institute of Technology (1970) for studies in peptide chemistry with Professor D.S. Kemp. As an Assistant Professor at the University of California at Los Angeles (1970-1976) he developed the three-phase test for reactive intermediates. In 1976 he moved to the University of Pittsburgh where he rose to the rank of Professor of Chemistry and developed cleft-like structures for studies in molecular recognition. In 1989 he returned to the Massachusetts Institute of Technology, where he was the Camille Dreyfus Professor of Chemistry and devised synthetic, self-replicating molecules. In July of 1996, he moved his research group to The Scripps Research Institute to become the Director of The Skaggs Institute for Chemical Biology, where he continues to work in self-assembling systems and the sensing and destruction of nerve agents. In November of 2013 he opened a laboratory in the Chemistry Department of Fudan University, Shanghai, China as a Visiting Professor under the 1000 Talents Program.

Biographical Data

Birth date: April 11, 1944; Beregszasz, Hungary

Education: B.A. University of Kansas, 1966
Ph.D. Massachusetts Institute of Technology, 1970

Positions: University of California, Los Angeles
Assistant Professor, 1970-1976

University of Pittsburgh
Associate Professor, 1976-1979
Professor, 1980-1989

Massachusetts Institute of Technology, Cambridge, MA
Professor, 1989-1991
Camille Dreyfus Professor of Chemistry, 1991-1996

The Scripps Research Institute, La Jolla, CA
Director, The Skaggs Institute for Chemical Biology
and Professor of Chemistry, 1996-

Professor of Chemistry,
1000 Talents Program
Fudan University, Shanghai, China, 2013-

Selected Honors and Awards

A. P. Sloan Fellow, 1976-1978
A. von Humboldt Fellow, 1981
J. S. Guggenheim Fellow, 1986
A.C. Cope Scholar Award, 1991
American Academy of Arts and Sciences, 1993
National Academy of Science, 1994
James Flack Norris Award in Physical Organic Chemistry, ACS, 1997
Hungarian Academy of Science, 2001
American Institute of Chemists, Chemical Pioneer Award, 2002
Ronald Breslow Award for Achievement in Biomimetic Chemistry, ACS 2004
European Academy of Science (Academia Europaea) Member, 2005
Distinguished Scientist Award, ACS, San Diego, California, 2006
University of Oregon Creativity Award in Chemistry, Dance and Music, 2007
Tau-Shue Chou Award, Academia Sinica, 2008
A. von Humboldt Senior Scientist Award, Germany, 2009
Honorary Doctorate, University of Bonn, 2010
Nichols Medal, ACS New York Section, 2011
Prelog Medal, ETH Zurich, 2012

Named Lectureships

Organic Synthesis, Inc. Lecturer, Notre Dame, 1986
J. Clarence Karcher Lecturer, University of Oklahoma, 1988
Frontiers of Science Lectures, Texas A & M University, 1989
Dow Lectures, Michigan State University, 1989
Merck Lecturer, University of Sherbrooke, 1990
Distinguished Lecture Series, University of Florida, 1990
Bender Lectures, Northwestern University, 1990
Abbot Lecturer, Yale University, 1991
H. M. Friedman Lecturer, Rutgers University, 1991
Phillips Lectures, Haverford College, 1991
Special Lecture Series, Scripps Research Institute, 1991
Organic Synthesis, Inc. Lecturer, Colorado State Univ. 1991
MIKI Keynote Lecturer, University of Kansas, 1991
Merck Lecturer, Lehigh University, 1992
Merck Lecturer, University of Montreal, 1992
Franklin Lecturer, University of Kansas, 1992
Bio Mega Lecturer, Montreal, 1993
Miles Lecturer, University of New Hampshire, 1993
Syntex Lecturer, University of Colorado, 1993
Wm. Rauscher Lecturer, Rensselaer Polytechnic, 1993
Seman Lecturer, Kent State University, 1994
Robert Robinson Memorial Lecturer, Oxford, 1994
Welch Foundation Lecturer, Texas Universities, 1994
Linus Pauling Lecturer, Stanford University, 1995

E. K. C. Lee Lecturer, UC Irvine, 1995
Kilpatrick Lecturer, Illinois Institute of Technology, 1996
Lord Lectureship, Allegheny College, 1996
Watkins Lectureship, Wichita State University, 1997
Hirschman Lecturer, Oberlin College, 1998
Oersted Lecturer, Technical University of Denmark at Lyngby, 1998
S.C. Lind Lectureship, University of Tennessee, Knoxville, 1998
Lyle Dawson Lecturer, University of Kentucky, 1998
Reynold Fuson Lectureship, University of Nevada, Reno, 1999
Brantford Chemicals Distinguished Lecturer, Queen's University, Canada, 1999
David Ginsburg Memorial Lecture, Israel Institute of Technology, Israel, 2000
Schlemper Distinguished Lecture in Chemistry, University of Missouri, 2000
Priestley Lecturer, Pennsylvania State University, 2000
Martino Steer Memorial Lecturer, Modena University, Italy, 2000
Treat B. Johnson Lecturer, Yale University, 2001
Lipscomb Lecturer, University of South Carolina, 2001
Gomberg Lecturer, University of Michigan, 2001
Guthikonda Lecture, Columbia University, 2001
Henry J. Shine Endowment Lectureship, Texas Tech University, 2001
Jack Fox Lecture, Memorial Sloan-Kettering Cancer Center, 2002
Consensus Lecturer, Tufts University, 2002
Woodward Scholar Lecturer, Harvard University, 2002
Molecular Science Forum, Chinese Academy of Sciences, 2003
Robert Levine Lecture, University of Pittsburgh, 2003
ICI Lecture, Third Bristol Synthesis Meeting, Bristol, UK, 2003
Inaugural Winstein Lecturer, University of California Los Angeles, 2004
Evans Award Lecturer, Ohio State University, 2006
Chemistry Day Lecturer, University of Montreal, 2006
Chemistry Week Lecturer, Georgetown University, 2006
Wyeth Lecturer, Princeton University, 2006
Marker Lecturer, University of Maryland, 2007
Haberman Lecturer, Marquette University, 2007
Joullie Lecturer, University of Pennsylvania, 2008
Tau-shue Chou Lecturer, Taipei, Taiwan, 2008
Frontiers in Chemistry, Case Western Reserve, 2009
Allergan Distinguished Lecturer, California State University, Long Beach, 2009
Frontiers of Chemistry Lectures, Texas A&M University, 2010
Kohler Lectures, UC Riverside, 2010
Nichols Award Lecture, New York, 2011
International Year of Chemistry Lecture, University of Miami, 2011
George Buechi Lectures, MIT, 2012
Slayton Evans Lecturer, Univ. N. Carolina, 2012
William Pyle Philips Distinguished Visitor in Chemistry, Haverford College, 2012
Prelog Lecture, ETH, Switzerland 2012
Mahler Distinguished Lecturer, Univ. Texas Austin, 2013
Frontiers of Chemistry Lecturer, Wayne State Univ., 2014
Frontiers in Organic Chemistry Lecturer, Univ. of Illinois, 2014

Recent Lectures at Universities and Companies

2008: SupraCat, Barcelona; Complutense Univ., Autonoma Univ. of Madrid; National Taiwan Univ., Tsing Hua Univ., Academia Sinica, Taiwan; Stanford Univ.; Imperial College, London; Ecole Polytechnique, Palaiseau, France; Univ. of Paris V; CEA, Gif sur Yvette; ISMSC Las Vegas; IIN, Evanston, IL.

2009: Univ. of Paris VI, Pierre et Marie Curie; Univ. of Paris V; Univ. of Paris XI; Univ. of Bordeaux; Solvay, Dijon; SUNY, Buffalo; Univ. of Rochester; Lubrizol, Cleveland; Technical Univ., Berlin; Univ. of Bonn; Univ. of Essen; ICIQ, Tarragona; ISMSC, Maastricht; Demokritos; Nat. Inst. for Physical Chem., Athens; Hebrew Univ., Jerusalem; Weizmann Inst., Rehovot; MPI, Mühleim; LMU, Munich; CSU, Long Beach; Baekeland Symposium, Rutgers U.

2010 Free Univ. of Berlin; Univ. of Bonn; TU Munich; Univ. of Ulm; Univ. Southern California; Univ. of Vienna; Univ. of Innsbruck; Politecnico Univ. of Milan, ISMSC Nara, ICSM Kyoto, Osaka Univ., Japan; Dong Hwa Univ., Chiao Tung Univ., National Taiwan Univ., Taiwan; Univ. of Edinburgh, Scotland; Notre Dame Univ., Namur, Belgium; Univ. of Paris XI; UC Riverside, Texas A&M Univ.; Pacifichem, Hawaii.

2011 Nichols Award Symposium, N.Y.; Tel Aviv U., Hebrew U., Ben Gurion U., Weizmann Inst., Israel; Univ. of Graz, Austria; Univ. of Venice, Italy; Calixarene Symposium, Tarragona; Supramolecular Chem., Beijing; Fudan U., SIOC, Shanghai; Nat. Inst. for Physical Chem., Athens; CIPS-LMU, Munich; Univ. of Miami, Florida.

2012 Czech. Acad. of Science, Prague; Roche, Mannheim; Univ. N. Carolina; Duke U.; Haverford College; Tulane U.; MIT; Boston College; U. Mass. Amherst; Univ. of Cambridge; National Defense U. (visit at Scripps); Univ. of Geneva; CEA, Grenoble; E. N. S., Lyon; Bielefeld U.; Stockholm U.; Uppsala U.; Roche, Basel; Univ. of Basel; ETH, Zurich.

2013 Univ. of Texas, Austin; Univ. of California, San Diego; Fudan Univ., Zhejiang Univ., Nanjing Univ., East China Normal U., China; Bowie State U., Maryland.

2014 Wayne State Univ.; Shanghai Normal Univ., East China Normal Univ., ISMSC at SIOC, Shanghai; Univ. Utrecht; NORM, Univ. Montana; ICIQ Tarragona, Univ. Castellon, Univ. of Valencia, Spain; ISACS, U.C. San Diego; Beijing Normal Univ., CAS, Nankai Univ., Northwest China Univ. Xian, China; Scheduled: Univ. of Illinois; Princeton Univ.

Research Interests

Self-Assembling and Self-Replicating Systems, Molecular Encapsulation, Biomimetic Chemistry, Innate Immunity, Nerve Agent Antidotes and Sensors.

Editorial Advisory Boards:

Journal of Molecular Recognition, 1987-1995
Chemtracts, 1987-1996
Bioorganic and Medicinal Chemistry Letters, 1991-2001
Bioorganic and Medicinal Chemistry, 1991-2001
Journal of the Chemical Society, Perkin Transactions, 1992-1998
Chemistry and Biology, 1994-
Accounts of Chemical Research, 1996-1998
Journal of Organic Chemistry, 1996-2000
Current Opinion in Chemical Biology, 1997-
Tetrahedron Publications, 1991-2001
Progress in Physical Organic Chemistry, 1998-2002
Journal of Supramolecular Chemistry, 2001-

Scientific Advisory Boards:

Commercial
Amira (RepliGen), Cambridge, Massachusetts 1990 -1994
Procept, Cambridge, Massachusetts 1991-1997
Darwin Molecular, Seattle, Washington 1992-1995
Cubist Pharmaceuticals, Cambridge, Massachusetts 1992-2001
Discovery Partners International, La Jolla, California, 1996-2001
EPIgen, La Jolla, California, 1996-2001
Synteni (Incyte), Fremont, California, 1997-2001
LaunchCyte, Pittsburgh, PA, 2000-2002
Neogenesis, Cambridge, Massachusetts, 1997-2003
Personal Chemistry, Uppsala, Sweden, 1999-2003
Activx, La Jolla, CA, 2001-2004
Kémia, La Jolla, CA, 2002-2008

Institutional
Board on Chemical Sciences and Technology, National Research Council, 1992.
University of Chicago, Physical Sciences Division, Chicago, Illinois, 2000-2006
National Cancer Institute, National Institutes of Health, Bethesda, MD, 2001-2004
The Institute of Chemical Research of Catalonia, Spain, 2001-
Elector, University of Oxford, Chair in Chemical Biology, 2001
Member, Wittgenstein Prize and START Award Jury, Vienna, Austria, 2008 –
Center for Integrated Protein Science, Munich, 2009-

Member, Committee to Assess Supercritical Water Oxidation System Testing for the Blue Grass Chemical Agent Destruction Pilot Plant, National Research Council, 2012-2013.

Member, Standing Committee on Chemical Demilitarization, Board on Army Science and Technology, National Academy of Science, 2013-

Visiting Professorships:

Technical University of Munich, Germany, 1981
University of Castellon, Spain, 1986
Ecole Normal Superior, Paris, 1997
Harvard University, 2002
University of Paris V, 2008
LMU, Munich, 2009
Free University of Berlin, Germany, 2009
Fudan University, Shanghai, China, 2013-

PUBLICATIONS

1. D. S. Kemp and Julius Rebek, Jr. Peptide Racemization Mechanism. A Kinetic Isotope Effect as a Means of Distinguishing Enolization from Oxazolone Formation, *J. Am. Chem. Soc*. **1970**, *92*, 5792.

2. D. S. Kemp, Zmira Bernstein and Julius Rebek, Jr. Racemization during Peptide Couplings Using the Mixed Anhydride, N-Hydroxysuccinimide Ester, 8-Hydroxyquinoline Ester, and Acyl Azide Methods, *J. Am. Chem. Soc*. **1970**, *92*, 4756.

3. Julius Rebek and David Feitler, An Improved Method for the Study of Reaction Intermediates. The Mechanism of Peptide Synthesis Mediated by Carbodiimides, *J. Am. Chem. Soc*. **1973**, *95*, 4052.

4. Julius Rebek and David Feitler, Mechanism of the Carbodiimide Reaction II. Peptide Synthesis on the Solid Phase, *J. Am. Chem. Soc.* **1974**, *96*, 1606.

5. William R. Roush, David Feitler and Julius Rebek, Jr. Polymer-Bound Tosyl Azide, *Tetrahedron Lett.* **1974**, 1391.

6. Julius Rebek, Jr. Stephen F. Wolf and Allen B. Mossman, Substituted Peroxycarbamic Acids as Epoxidizing Agents, *J. Chem. Soc. Chem. Comm*. **1974**, 711.

7. J. Rebek and F. Gavina, The Three-Phase Test for Reactive Intermediates. Cyclobutadiene, *J. Am. Chem. Soc.* **1974**, *96*, 7112.

8. D. S. Kemp, S.-W. Wang, J. Rebek, Jr. R. C. Mollan, C. Banquer and G. Subramanyam, Peptide Synthesis with Benzisoxazolium Salts--II. Activation Chemistry of 2-ethyl-7-hydroxybenzisoxazolium Fluoroborate; Coupling Chemistry of 3-acyloxy-2-hydroxy-N-ethylbenzamides, *Tetrahedron*, **1974**, *30*, 3955.

9. D. S. Kemp, S. J. Wrobel,Jr. S.-W. Wang, Z. Bernstein and J. Rebek, Jr. Peptide Synthesis with Benzisoxazoline Salts--III. Utility of 7-hydroxy-2-ethyl-benzisoxazolium Fluoroborate in the Synthesis of Peptides, *Tetrahedron*, **1974**, *30*, 3969.

10. Julius Rebek, David Brown and Stephen Zimmerman, The Three-Phase Test for Reaction Intermediates. Nucleophilic Catalysis and Elimination Reactions, *J. Am. Chem. Soc.* **1975**, *97*, 454.

11. J. Rebek and F. Gavina, The Three-Phase Test for Reaction Intermediates. Metaphosphates, *J. Am. Chem. Soc.* **1975**, *97*, 1591.

12. J. Rebek and D. Feitler, Peptide Synthesis with Carbodiimide. III. Racemization, *Int. Peptide Protein Res.* **1975**, *7*, 167.

13. J. Rebek, Mechanisms of Peptide Synthesis with Carbodiimides, in *Peptides 1974*, Proceedings of the Thirteenth European Peptide Symposium, Kiryat Anavim Israel, April 28- May 3, 1974. Edited by Yecheskel Wolman, John Wiley & Sons, New York (**1975**), p. 27.

14. J. Rebek and F. Gavina, The Three-Phase Test for Reaction Intermediates. Evidence for Monomeric Metaphosphates, *J. Am. Chem. Soc.* **1975**, *97*, 3221.

15. Julius Rebek, Jr. and F. Gavina, The Three-Phase Test. Detection of Free Cyclobutadiene, *J. Am. Chem. Soc.* **1975**, *97*, 3453.

16. J. Rebek, S. Zimmerman and D. Brown, New Probes for the Study of Acylation Reactions, *J. Am. Chem. Soc.* **1975**, *97*, 4407.

17. J. W. Goers, V. N. Schumaker, M. M. Glovsky, J. Rebek and H. J. Muller-Eberhard, Complement Activation by a Univalent Hapten-Antibody Complex, *J. Biol. Chem.* **1975**, *250*, 4918.

18. J. Rebek, D. Brown and S. Zimmerman, The Mechanism of the Carbodiimide Reaction, IV, *Peptides: Chemistry, Structure and Biology*, R. Walter and J. Meienhofer, Eds. Ann Arbor Michigan, **1975**, p. 371.

19. J. Rebek and D. Brown, Nucleophilic Catalysis of Acyl Transfers, *Peptides 1976*, A Loffet, Ed. Brussels Univ. Press, Brussels, Belgium, **1976**, p. 61.

20. J. Rebek, F. Gavina, D. Brown and S. Zimmerman, The Three-Phase Test for Reactive Intermediates, *Polym. A.C.S. Div. Polym. Chem.* **1976**, *17*, 230.

21. L. T. Scott, J. Rebek, L. Ovsyanko and C. Sims, Organic Chemistry on the Solid Phase: Site-Site Interactions on Functionalized Polystyrene, *J. Am. Chem. Soc.* **1977**, *99*, 625.

22. J. Rebek and J.-C. Gehret, Progress on the Synthesis of Mitosenes, *Heterocycles*, **1977**, *6* ,1531.

23. J. Rebek, F. Gavina and C. Navarro, The Three-Phase Test: The Conant-Swan Reaction, *Tetrahedron Lett.* **1977**, 3021.

24. J. Rebek and J.-C. Gehret, A Synthetic Approach to the Mitosenes, *Tetrahedron Lett.* **1977**, 3027.

25. J. Rebek, S. Wolf and A. Mossman, Singlet Oxygen and Epoxidation from the Dehydration of Hydrogen Peroxide, *J. Org. Chem.* **1978**, *43*, 180.

26. J. Rebek and J. E. Trend, On Binding to Transition States and Ground States: Remote Catalysis, *J. Am. Chem. Soc.* **1978**, *100*, 4315.

27. S. Wolf, C. S. Foote and J. Rebek, Chemistry of Singlet Oxygen. XXIX. A Specific Three-Phase Kautsky Test for Singlet Oxygen, *J. Am. Chem. Soc.* **1978**, *100*, 7770.

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30. J. Rebek and J. E. Trend, On the Rate of Site-Site Interactions in Functionalized Polystyrenes, *J. Am. Chem. Soc.* **1979**, *101*, 737.

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32. J. Rebek, R. McCready, S. Wolf and A. Mossman, New Oxidizing Agents from the Dehydration of Hydrogen Peroxide, *J. Org. Chem.* **1979**, *44*, 1485.

33. J. Rebek, Mechanistic Studies Using Solid Supports: The Three-Phase Test, Tetrahedron Reports, #60, *Tetrahedron*, **1979**, *35*, 723.

34. J. Rebek, R. V. Wattley, S. Chakravorti and J. E. Trend, Allosteric Effects in Organic Chemistry: Site-Specific Binding, *J. Am. Chem. Soc.* **1979**, *101*, 4333.

35. J. Rebek and R. McCready, New Epoxidation Reagents Derived from Alumina and Silicon, *Tetrahedron Lett.* **1979**, 4337.

36. Joseph A. Horton, Charles Kerber, John M. Herron, Julius Rebek, Reduction of Edge Position Uncertainty on Computed Tomographic (CT) Scans, *Proc. Soc. Phot. Instr. Eng.* **1979**, Vol. 207, p. 222-223.

37. J. Rebek and R. V. Wattley, New Macrocyclic Polyethers with Remote Binding Sites, *J. Het. Chem.* **1980**, *17*, 749-751.

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41. J. Rebek, Jr. T. Costello and R. V. Wattley, Large Rate Enhancements Through Preferential Binding to Transition States, *Tetrahedron Lett.* **1980**, 2379-80.

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45. J. Rebek, Jr. and Steven Shaber, Recent Progress Toward the Synthesis of Mitosenes, *Heterocycles*, **1981**, *15*, 161-163.

46. J. Rebek, Progress in the Development of New Epoxidation Reagents, *Heterocycles*, **1981**, *15*, 517-545.

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