Acto de investidura como doutores *honoris causa* do **Prof. Dr. D. Bernard L. Feringa** e do **Prof. Dr. D. Nicholas A. Peppas**

8 Maio 2019

UNIVERSIDADE DE SANTIAGO DE COMPOSTELA

Investiture of **Prof. Dr. Bernard L. Feringa** and **Prof. Dr. Nicholas A. Peppas** as Doctors *Honoris Causa*

8 May 2019

UNIVERSIDADE DE SANTIAGO DE COMPOSTELA

Protocolo

Procesión da comitiva académica

Desenvolvemento do acto

Investidura do Prof. Dr. D. Bernard L. Feringa

Pedimento	Padriño, Prof. Dr. D. José Luis Mascareñas Cid
Lección doutoral	Prof. Dr. D. Bernard L. Feringa
Laudatio	Padriño, Prof. Dr. D. José Luis Mascareñas Cid
Concesión	Sr. Reitor
Imposición da esclavina, a borla, o anel e entrega do libro	Padriño, Prof. Dr. D. José Luis Mascareñas Cid
Xuramento	Sra. Secretaria Xeral
Imposición da medalla	Sr. Reitor
Agradecemento	Prof. Dr. D. Bernard L. Feringa

Investidura do Prof. Dr. D. Nicholas A. Peppas

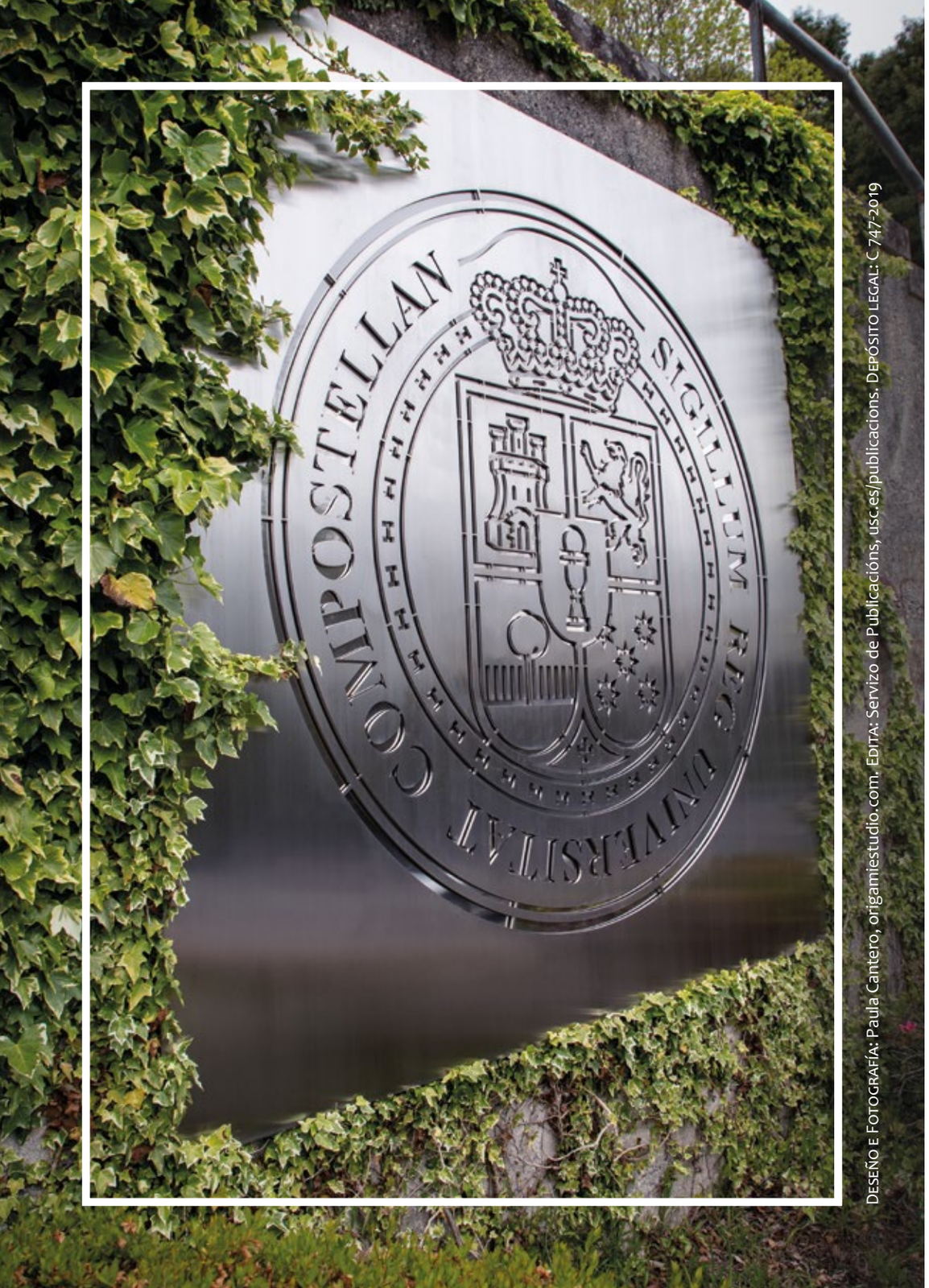
Pedimento	Madriña, Prof.ª Dr.ª D.ª M.ª José Alonso Fernández
Lección doutoral	Prof. Dr. D. Nicholas A. Peppas
Laudatio	Madriña, Prof.ª Dr.ª D.ª M.ª José Alonso Fernández
Concesión	Sr. Reitor
Imposición da esclavina, a borla, o anel e entrega do libro	Madriña, Prof.ª Dr.ª D.ª M.ª José Alonso Fernández
Xuramento	Sra. Secretaria Xeral
Imposición da medalla	Sr. Reitor
Agradecemento	Prof. Dr. D. Nicholas A. Peppas

Discurso do Sr. Reitor

Gaudeamus igitur

Procesión de saída

Viño de honra ofrecido no claustro do Colexio de Fonseca



Deseño e fotografía: Paula Cantero, origamiestudio.com. Edita: Servizo de Publicacións, usc.es/publicacions. Depósito legal: C 747-2019

Bernard L. Feringa

Bernard L. Feringa estudou Química na Universidade de Groningen (Holanda) e doutorouse (1978) na mesma Universidade, baixo a dirección do profesor Hans Wynberg, cun traballo sobre a xeración de quiralidade axial mediante o acoplamento asimétrico de fenois e no deseño e síntese de alquenos impedidos quirais. Tras o seu doutoramento, integrouse na industria e obtivo unha praza nos laboratorios de investigación da Royal Dutch Shell en Amsterdam, onde traballou tanto en catálise fundamental como aplicada, centrando a súa investigación principalmente nas oxidacións catalíticas e no deseño de novos ligandos e catalizadores. Posteriormente, trasladouse ao centro de Shell Biosciences en Sittingbourne, Reino Unido, onde traballou na síntese de herbicidas e investigou nos campos da síntese total e da química biolóxica. Despois deste período industrial, en 1984 Feringa foi nomeado profesor axudante na Universidade de Groningen e catedrático en 1988, sucedendo ao seu mentor, profesor Hans Wynberg. En 2004 foi nomeado profesor Jacobus H. van't Hoff en Ciencias Moleculares. Foi elixido membro honorario estranxeiro da Academia Americana das Artes e das Ciencias; en 2008 foi nomeado «Academy Professor» e investido cabaleiro pola Súa Maxestade a Raíña dos Países Baixos. Na actualidade é vicepresidente da Real Academia de Ciencias de Holanda e é membro do Consello Europeo de Investigación.

A súa investigación nos últimos anos está centrada na síntese orgánica e na química física orgánica, especialmente en catálise, as máquinas moleculares, a optofarmacoloxía, o autoensamblado e os nanosistemas moleculares, onde a estereoquímica seguiu sendo o eixo dominante das súas investigacións. Entre os seus traballos en catálise destacan o desenvolvemento da catálise asimétrica baseada no ADN, o deseño de procesos selectivos de oxidación de olefinas, a introdución dunha nova clase de ligandos quirais, as fosforamiditas baseadas no binol, hoxe coñecidas como ligandos de Feringa, e o desenvolvemento de procesos asimétricos de formación de enlaces C-C con varios compostos organometálicos. O profesor Feringa tamén desenvolveu un programa destacado

no eido dos interruptores e motores moleculares. Baseándose nos alquenos impedidos, desenvolvidos durante os seu doutoramento, e fusionando o poder da química sintética, a fotoquímica e a espectroscopía, foi quen de construír toda unha clase de interruptores moleculares quiro-ópticos con propiedades que van dende o almacenamento da información ata o control de biosistemas ou cristais líquidos. Estes estudos evolucionaron ao descubrimento do primeiro motor molecular unidireccional inducido pola luz, publicado en *Nature* en 1999, que supuxo un paso importante no desenvolvemento das máquinas moleculares, e está considerado o traballo fundacional da nanotecnoloxía molecular. Feringa demostrou que os seus motores moleculares poden funcionar mentres están conectados a unha superficie e que o seu movemento pode usarse para desprazar obxectos macroscópicos. Tamén deseñou e construíu un *nanocoche*, é dicir, un composto nanométrico que contén catro motores moleculares como rodas e que se move sobre unha superficie ao someterse a un estímulo externo, un exemplo da conversión do movemento molecular rotatorio en movemento translativo.

A súa investigación foi recoñecida con numerosos premios, incluíndo o Premio da Ciencia Europea Koerber en Alemaña (2003), o Premio Spinoza en España (2004), a Medalla de Ouro Prelog en Zürich (2005), o Premio Norrish (Sociedade de Química Americana, 2007), a Medalla Paracelsus en Alemaña (2008), a Medalla da Quiralidade en Italia (2009), o Premio de Estereoquímica Orgánica RSC en Reino Unido (2011), o Premio Humboldt en Alemaña (2012), o Gran Pemio Científico Cino del Duca (Academia de Francia, 2012), a Medalla Marie Curie en Reino Unido (2013), a Medalla de Ouro de Nagoya en Xapón (2013) e o Premio Arthur C. Cope (Sociedade de Química Americana, 2015).

O profesor Feringa foi profesor visitante en varias universidades e institutos de investigación de todo o mundo, incluída a Universidade de Santiago de Compostela en 2001.

En 2016 recibiu o Premio Nobel de Química, xunto cos profesores Fraser Stoddart e Jean Pierre Sauvage, polo deseño e síntese de máquinas moleculares.

José Luis Mascareñas

JOSÉ LUIS MASCAREÑAS é doutor en Química pola Universidade de Santiago de Compostela, na que é catedrático de Química dende o ano 2005, despois de ser seleccionado nun concurso de habilitación nacional (2003). Foi investigador posdoutoral nas universidades de Stanford (EE.UU., 1989 e 1990, Paul Wender) e Harvard (EE.UU., 1992 e 1995, Greg Verdine), e profesor visitante na Universidade de Cambridge (Reino Unido, 2009) e no Instituto Tecnolóxico de Massachusetts (MIT, EE.UU., 2013).

A investigación do seu grupo é moi multidisciplinar e céntrase en tres liñas principais: a catálise metálica, dirixida especialmente ao desenvolvemento de métodos para a preparación sostible de medicamentos e fármacos bioactivos; o recoñecemento biomolecular, que procura a modulación selectiva de certos xenes empregando moléculas sintéticas, e a química biolóxica na interface coa catálise, liña que está principalmente enfocada ao deseño e desenvolvemento de encimas artificiais baseados en metais.

Nos últimos dez anos ten publicado máis de 120 artigos científicos (dun total de 200, e con un impacto medio superior a 9), moitos deles nas revistas académicas máis importantes de química como son *J. Am. Chem. Soc.* (24 artigos), *Angew. Chem.* (22) ou *Nature Commun.* (3). É coinventor de 21 patentes e participou no inicio dunha *spin-off*, a MD.USE.

No ano 2009 recibiu o premio Janssen Cilag de Química Orgánica outorgado pola Real Sociedade Española de Química (RSEQ), que ademais lle concedeu a Medalla de Ouro en 2015, o recoñecemento máis alto en química en España. No ano 2013 recibiu a Medalla de Ouro da Universidade de Santiago de Compostela e tamén acadou un proxecto Advanced Grant do ERC (2014-2020). Foi seleccionado como membro da Academia Europea das Ciencias (2016) e da Fundación Gadea (España, 2017) e en 2015 nomeado responsable español da sección de Química Orgánica da Europeal Chemical Society (EuChemS). En 2018 o profesor Mascareñas recibiu o Premio da Crítica Galicia na modalidade de Investigación.

É director científico do Centro Singular de Investigación en Química Biolóxica e Materiais Moleculares (CiQUS) dende 2014, tendo contribuído a situar este centro de investigación como unha das referencias internacionais no ámbito da química (conta con máis de 170 membros, e 6 proxectos ERC). Tamén é o fundador e primeiro presidente do grupo especializado de química biolóxica da RSEQ (creado no ano 2012), que ten na actualidade case 300 membros.

Supervisou 33 teses doutorais e dirixiu máis de 100 alumnos de máster e grao ou licenciatura. 14 antigos estudantes seus obtiveron un posto académico nalgún lugar do mundo, e outros 14 teñen conseguido importantes postos na industria, dous deles responsables da creación de novas empresas de base tecnolóxica.

Impartiu máis de 130 conferencias invitadas, incluíndo algunhas charlas honoríficas como son a «Serratosa Lecture» (Barcelona, 2016) ou a «GDCh-Kolloquium Lecture» (Berlín e Marburg, 2015). Foi presidente do comité científico ou organizador de oito congresos internacionais, e é membro de máis de dez comités directivos e fundacións.

© USC

Nicholas A. Peppas

Nicholas A. Peppas é graduado (1971, Universidade Técnica Nacional de Atenas) e doutor (1973, Massachusetts Institute of Technology, MIT) en Enxeñaría Química. Actualmente é titular da Cockrell Family Regents Distinguished Chair con mencións no Departamento de Enxeñaría Biomédica, no Departamento de Enxeñaría Química, nos Departamentos de Cirurxía e Pediatría da Escola de Medicina de Dell e no Departamento de Farmacia Molecular e Drug Delivery da Facultade de Farmacia da Universidade de Texas en Austin. Tamén é director do Instituto de Biomateriais, Drug Delivery e Medicina Rexenerativa.

O profesor Peppas é doutor *honoris causa* polas universidades de Gante, Parma, Atenas, Patras, Ljublijana, Técnica Nacional de Atenas e Tesalónica, e ten cátedras honoríficas en Sichuan, Unión Médica da Universidade de Pequín, Hospital PLA e Escola de Medicina (China), Beihang (China) e Northwestern Politécnica.

É líder mundial en liberación de fármacos e bio-nanotecnoloxía, biomateriais, nanomateriais, modelaxe matemática de procesos biolóxicos e física de polímeros. O enfoque multidisciplinar da súa investigación combina a bioloxía molecular e celular moderna coa enxeñaría para analizar estruturas biolóxicas complexas e deseñar a próxima xeración de sistemas para o tratamento do paciente. Estableceu os fundamentos e o deseño racional de biomateriais e sistemas de liberación de fármacos nos últimos corenta anos e desenvolveu modelos de difusión de fármacos e proteínas en dispositivos de liberación controlada e tecidos biolóxicos. Empregando a teoría da difusión nas redes macromoleculares, desenvolveu as ecuacións que describen a difusión *Fickian* e *non-Fickian* en procesos de liberación controlada de fármacos, para cuxa análise a *ecuación de Peppas* se converteu en método estándar. Do mesmo xeito, desenvolveu o marco teórico para a análise do transporte de fármacos de baixa solubilidade (BCS Clase III e IV) a través de portadores poliméricos reticulados (*teoría Peppas-Reinhart*), hidroxeles iónicos (*teoría Brannon-Peppas*) e sistemas inchables (*ecuación Sahlin-Peppas*).

Peppas é recoñecido como o autor máis citado e publicado en materia de liberación de fármacos e materiais intelixentes, e como un dos cinco científicos farmacéuticos na Medicine Make Power List. Desenvolveu os novos sistemas muco e bioadhesivos que interactúan molecularmente co moco e os tecidos e foron quen de prolongar a biodispoñibilidade de proteínas e péptidos. Facendo uso de polímeros intelixentes xa en 1980, Peppas e o seu grupo foron pioneiros en deseñar sistemas sensibles ao pH e á temperatura para a liberación de estreptoquinasa e outros encimas fibrinolíticos. O seu traballo levou á incorporación das novas tecnoloxías para a administración oral de insulina e outras proteínas. Estes dispositivos liberan insulina por vía oral, «protexéndoa» a través do estómago, do intestino delgado e, finalmente, do sangue, sen necesidade de os diabéticos necesitaren varias inxeccións diarias.

Autor ou co-editor de 37 libros, 1 600 publicacións e 55 patentes internacionais, é un científico altamente citado (124 000 citas, H=164) e supervisou a investigación de 985 científicos que traballaron no seu laboratorio. O profesor Peppas é membro, entre outras, da Academia Nacional de Medicina (EUA), da Academia Nacional de Enxeñaría (EUA), da Academia Americana de Artes e Ciencias, da Academia Nacional de Inventores, da Academia de Atenas (i.e. Academia Grega), da Real Academia de Farmacia de España e do Consello Nacional de Materiais e Fabricación dos Estados Unidos. Foi recoñecido cos máis altos galardóns de diversas sociedades científicas. En 2008 a Sociedade Americana de Enxeñaría Química nomeouno *Un dos cen enxeñeiros químicos da Era Moderna*.

Foi presidente da Unión Internacional de Sociedades de Ciencia de Biomateriais e Enxeñaría (2008-2016), catedrático da Sección de Enxeñaría da Asociación Americana para o Avance da Ciencia, catedrático do Consello das Cátedras de Enxeñaría Biomédica, presidente da Sociedade para Biomateriais (2003-2004) e presidente da Sociedade de Liberación Controlada (1987-1988).

Como embaixador da súa área, foi profesor visitante en diversas universidades: Xenebra, París-Sur, Parma, Pavía, Nápoles Federico II, Libre de Berlín, Santiago de Compostela, Complutense de Madrid, Hoshi, Hacettepe, Nacional e Kapodistriana de Atenas, Hebrea de Xerusalén, Tecnolóxica Nanyang e o Instituto Tecnolóxico de California.

María José Alonso

María José Alonso é licenciada (1982) e doutora (1985) en Farmacia pola Universidade de Santiago de Compostela (USC). Traballou como investigadora posdoutoral na Universidade de París-Sur (1986-1987) e como profesora visitante na Universidade de Angers (1989), así como no Instituto Tecnolóxico de Massachusetts (MIT) entre 1991-1992 e en 2011. Dende 1998 é catedrática de Biofarmacia e Tecnoloxía Farmacéutica da USC, da que, ademais, foi vicerreitora de Investigación e Innovación entre 2006 e 2010. Nesta responsabilidade deseñou un novo modelo interdisciplinario de organización da investigación que acreditou o recoñecemento de *excelencia* polo goberno español e incorporou a USC aos campus españois de excelencia internacional.

Foi pioneira en España na nanotecnoloxía aplicada ao desenvolvemento de nanomedicinas, eido no que as súas achegas son moi coñecidas. Os seus descubrimentos levaron a avances significativos no desenvolvemento de novas terapias tópicas, transmucosas e parenterais. Ademais da súa intensa actividade docente, María José Alonso coordinou e participou nun elevado número de consorcios internacionais de investigación financiados pola OMS, a Fundación Gates, a Organización Mundial de Investigación contra o Cancro, o Instituto Nacional da Saúde (NIH) e a Comisión Europea.

É autora de máis de 270 contribucións científicas con máis de 16 400 citas (factor H 71) e inventora de 21 familias de patentes, a maioría delas licenciadas a compañías farmacéuticas. O seu nome vén sendo desde hai anos o primeiro no *ranking* de Farmacoloxía en España e un dos dez primeiros en todo o mundo no *top ten* do Times Higher Education.

No terreo académico combina a súa actividade investigadora cunha ampla gama de accións educativas, incluída a participación en varios programas de doutoramento europeos (Maria Curie e Erasmus Mundus). Ten tutelado

36 estudantes de doutoramento e 40 posdoutorais de todo o mundo e recibiu 30 premios, entre eles, o Premio Rey Jaime I ao mellor investigador no ámbito das novas tecnoloxías en España; o Premio Maurice Marie Janot da Association de Pharmacie Galénique Industrielle (AGPI, sociedade de tecnoloxía farmacéutica da UE); o Premio aos Fundadores da Sociedade de Liberación Controlada (CRS), e o Josefa Wonenburger e a Medalla Castelao, outorgados pola Xunta de Galicia.

Foi membro de varios comités científicos e consultivos das asociacións internacionais máis relevantes no seu campo e fundadora da sección hispano-portuguesa da Sociedade de Liberación Controlada, de cuxa parte internacional é actualmente presidenta. Foi conselleira da Fundación de Innovación Bankinter e asesora do Ministerio de Ciencia e Innovación, así como do Ministerio de Sanidade de España.

María José Alonso é membro da Academia de Medicina dos Estados Unidos, da Real Academia Nacional de Farmacia, da Academia Galega de Farmacia e da Real Academia de Ciencias de Galicia. Ademais, pertence ao College of Fellows do Instituto Americano de Enxeñaría Médica e Biolóxica e da Sociedade de Liberación Controlada. É, igualmente, membro do comité de coordinación da Plataforma Española de Nanomedicina e da Plataforma Tecnolóxica Europea de Nanomedicina, así como do consello editorial de once revistas de gran prestixio na liberación de fármacos e editora da revista *Drug Delivery and Translational Research*.

Tradición e modernidade

A Universidade de Santiago de Compostela proxecta sobre o futuro o seu medio milenio de historia. Afundindo as súas raíces na Europa renacentista, soubo evolucionar co tempo e converterse nunha das institucións que conformaron a identidade de Galicia. A comezos do século XXI, a súa vocación divulgadora do coñecemento e promotora da investigación convertérona en referencia mundial en eidos como a medicina, a biotecnoloxía, as humanidades ou a innovación científica.

O xermolo da Universidade sitúase nos remates do século XV, cando en Europa se difundía incesante a nova técnica da impresión de libros que había de revolucionar o mundo. En 1495, un rexedor de Compostela, Lope Gómez de Marzoa, funda o *Studium* de Gramática Latina no mosteiro bieito de San Paio de Antealtares, o chamado *Estudo Vello*. O impulso da familia Diego de Muros, xa nos albores do século XVI, consegue someter o Estudo á protección eclesiástica, permitindo a creación de cátedras de Dereito e Artes e, axiña, tamén de Dereito Canónico. Será pola decidida iniciativa do arcebispo Alonso III de Fonseca e Ulloa, humanista dotado das mellores características dun home do Renacemento, cando, coa fundación do Colexio de Santiago en 1521, se reforcen definitivamente os alicerces da actual institución académica. As primeiras Constitucións da Universidade de Santiago apróbanse en 1555.

No século XIX, a Universidade experimenta o seu maior desenvolvemento coa implantación de estudos científicos e de Humanidades acordes cos tempos, e coa inauguración en 1805 do seu edificio principal, hoxe Facultade de Xeografía e Historia. Da puxanza da Universidade na época falan fitos como o primeiro experimento eléctrico levado a cabo en España, que iluminou en 1851 esta mesma edificación grazas a un novidoso arco voltaico instalado polo científico Antonio Casares.

O ámbito universitario foi pioneiro na integración da muller en campos da sociedade, vedados durante séculos. As mulleres accederon á Universidade por primeira vez no curso 1913-1914, abrindo a porta a un proceso lento pero imparable. A Universidade compostelá foi tamén lugar de intercambio de ideas para as xeracións de intelectuais que fixeron avanzar a sociedade galega nos tempos convulsos do século XX e na Transición, e que crearon, grazas en parte ao seu paso por estas aulas, algunhas das obras máis singulares da cultura galega.

A Universidade divide a súa oferta académica en dúas cidades históricas, Santiago de Compostela e Lugo, urbes en ambos os casos que se aproximan aos

100 000 habitantes. Compostela é Patrimonio da Humanidade desde 1985 e meta dos Camiños de Santiago, que atraen cada ano a milleiros de peregrinos de todo o mundo desde a descuberta dos restos do Apóstolo. Concentrado de todas as esencias de Galicia, Santiago é desde sempre o faro político, social e cultural da Comunidade. Pola súa banda, Lugo, a antiga Lucus Augusti romana, conserva intacta a muralla do século II e todo o carácter do interior galego.

Con cinco séculos de historia, non é estraño que a Universidade atesoure un patrimonio artístico dificilmente comparable con calquera outra institución galega. En conxunto, a Universidade esténdese a través dun millón de metros cadrados de infraestruturas, repartidas en preto dun centenar de edificios, moitos deles auténticas xoias arquitectónicas. Algúns dos situados en Compostela retratan un pasado brillante, como a mencionada Facultade de Xeografía e Historia; a severa Facultade de Medicina (1901); o pazo de San Xerome (con raíces no século XV), sede da reitoría en plena praza do Obradoiro; ou a de Filosofía, do XVIII, a carón da antiga muralla da cidade. As novas instalacións tamén contan con deseños vangardistas, como os da Facultade de Ciencias da Comunicación en Compostela (1999), de Álvaro Siza; ou o moderno campus lucense.

Na actualidade cursan estudos na Universidade ao redor de 25 000 estudantes. En Lugo, o denominado Campus Terra concentra estudos do ámbito da sustentabilidade económica e medioambiental, con especialización no campo agroalimentario, tan importante para a economía galega. En Compostela, pola súa banda, atópanse dous campus, o Norte e o Campus Vida, este último de excelencia internacional e centrado en ámbitos como a medicina e a biotecnoloxía.

Da vocación universal da Universidade fala a procedencia internacional dunha parte moi apreciable do alumnado. Arredor de 1 500 matrículas corresponden a estudantes chegados doutros países, o que a converte nunha institución cosmopolita, aberta ao mundo e disposta a absorber e difundir coñecemento aos cinco continentes. Cada ano a Universidade envía ao exterior 400 mozos e mozas a través do programa Erasmus de intercambio universitario, e recibe un número moi similar procedente de 32 países.

A de Santiago é, así pois, unha universidade completa, con oferta docente na práctica totalidade dos saberes e decididamente enfocada a actuar como líder do progreso científico, económico e social. A investigación é un dos piares da institución, e dela saíron xa diversas iniciativas e empresas *spin off* que axudan a trasladar á economía real as achegas científicas acadadas.

A vida dentro da Universidade de Santiago non se reduce aos estudos e á investigación, senón que cada curso se propón un abano moi amplo de actividades que, ademais de ofertarse á comunidade universitaria, complementan a programación cultural (coro, teatro, ciclos musicais e literarios) e deportiva (natación, atletismo, tenis, hóckey) das cidades nas que está radicada.

A Universidade de Santiago de Compostela expresa tamén o seu respecto polo talento externo coa concesión de doutoramentos *honoris causa* a persoeiros dos máis diversos ámbitos, do científico ao político ou o cultural e artístico. Ata o momento preto de cen personalidades destes ámbitos foron recoñecidas con este título.

Con cincocentos anos de historia e decididamente impulsada ao futuro, a Universidade de Santiago conserva a vitalidade e a responsabilidade dunha institución fundamental para o progreso de Galicia e a mellora da sociedade.

Gaudeamus igitur

Gaudeamus igitur,

iuvenes dum sumus. *(bis)*

Post iucundam iuventutem,

post molestam senectutem,

nos habebit humus. *(bis)*

Vivat academia,

vivant professores. *(bis)*

Vivat membrum quodlibet,

vivant membra quaelibet,

semper sint in flore. *(bis)*


ENCHIRIDION
FRAS.
ROTERO.
ANNO XVI

Academic Ceremony Guide

Academic Retinue Procession

Ceremony components

Investiture of Prof. Dr. Bernard L. Feringa

Proposal	Sponsor, Prof. Dr. José Luis Mascareñas Cid
Doctoral speech	Prof. Dr. Bernard L. Feringa
Laudatio	Sponsor, Prof. Dr. José Luis Mascareñas Cid
Concession	Rector
Delivery of the cloak, tassel, pin and book	Sponsor, Prof. Dr. José Luis Mascareñas Cid
Oath	General Secretary
Medal award	Rector
Acknowledgements	Prof. Dr. Bernard L. Feringa

Investiture of Prof. Dr. Nicholas A. Peppas

Proposal	Sponsor, Prof. Dr. M.ª José Alonso Fernández
Doctoral speech	Prof. Prof. Dr. Nicholas A. Peppas
Laudatio	Sponsor, Prof. Dr. M.ª José Alonso Fernández
Concession	Rector
Delivery of the cloak, tassel, pin and book	Sponsor, Prof. Dr. M.ª José Alonso Fernández
Oath	General Secretary
Medal award	Rector
Acknowledgements	Prof. Dr. Nicholas A. Peppas

Speech by the Rector

Gaudeamus igitur

Closing procession

Reception. *Colexio Fonseca* cloister

DESIGN & PHOTOGRAPHY: Paula Cantero, origamiestudio.com. PUBLISHED BY: Servizo de Publicacións, usc.es/publicacions

Bernard L. Feringa

BERNARD L. FERINGA studied Chemistry at the University of Groningen in The Netherlands. He performed his PhD studies at the University of Groningen under the guidance of Professor Hans Wynberg working on the generation of axial chirality by asymmetric coupling of phenols and on the design and synthesis of chiral overcrowded alkenes. After his PhD studies (1978), Prof. Feringa moved to industry where he got a position at the Royal Dutch Shell Research Laboratories in Amsterdam. There, he was exposed to both fundamental and applied catalysis, where his research mainly focused on catalytic oxidations and novel ligand and catalyst design. After working as a research scientist at Shell in the Netherlands, he moved to Shell Biosciences center in Sittingbourne, UK, where he worked on the synthesis of herbicides, being in contact with the fields of total synthesis and chemical biology. After this industrial period, in 1984 he was appointed lecturer at the University of Groningen where he became full professor in 1988 succeeding his mentor, Prof. Hans Wynberg. In 2004 he was named the Jacobus H. van't Hoff Distinguished Professor of Molecular Sciences. He was elected Foreign Honorary member of the American Academy of Arts and Sciences; in 2008 he was appointed Academy Professor and was knighted by Her Majesty the Queen of Netherlands. Currently, he is member and vice-president of the Royal Netherlands Academy of Sciences and member of the European Research Council.

His research over the last years has been based in synthetic organic and physical organic chemistry, focusing on catalysis, molecular machines, optopharma, self-assembly and molecular nanosystems, where stereochemistry has remained the overarching scheme. Highlights of his work in catalysis include the development of the DNA-based asymmetric catalysis, the design of selective olefin oxidation processes, the introduction of a novel class of chiral ligands, binol-based phosphoramidites, today known as the Feringa ligands, and the development of catalytic asymmetric C-C bond formation processes with several organometallic compounds. Prof. Feringa has also been able to develop an

outstanding program in the field of molecular switches and motors. Based on the overcrowded alkene switches from his PhD, and merging the power on synthetic chemistry, photochemistry and spectroscopy, he was able to build an entire class of chiroptical molecular switches with important properties ranging from information storage to the control of biosystems or liquid crystals. These studies evolved to the discovery of the first light-driven unidirectional molecular motor, published in *Nature* in 1999, which was a stepping stone in the field of molecular machines and is considered as the groundwork for the progress of molecular nanotechnology. He has shown that these molecular motors can function while connected to a surface and the motion can be used to move macroscopic objects. He also designed and built the "nanocar", that is, a nanosized compound that contains four motor-based wheels and was shown to move on a surface upon subjection to an external stimulus, an example of the conversion of rotary molecular motion into translational motion.

Prof. Feringa's research has been recognized with a number of awards including the Koerber European Science Award in Germany (2003), the Spinoza Award in Spain (2004), the Prelog Gold Medal in Zürich (2005), the Norrish Award of the ACS (American Chemical Society, 2007), the Paracelsus Medal in Germany (2008), the Chirality Medal in Italy (2009), the RSC Organic Stereochemistry Award in the UK (2011), the Humboldt Award in Germany (2012), the Grand Prix Scientifique Cino del Duca (French Academy, 2012), the Marie Curie Medal in the UK (2013), the Nagoya Gold Medal in Japan (2013), the Arthur C. Cope Award (American Chemical Society, 2015).

He has given renowned lectures and undertaken visiting professorships in several universities and research institutes throughout the world, including the University of Santiago de Compostela in 2001. In 2016 Prof. Feringa received the Nobel Prize in Chemistry, jointly awarded with Fraser Stoddart and Jean Pierre Sauvage, for the design and synthesis of molecular machines.

José Luis Mascareñas

José Luis Mascareñas is a doctor in Chemistry from the University of Santiago de Compostela, where he has also had the Chemistry Chair since 2005, promoted after a national habilitation contest (2003). He has been a postdoctoral researcher at the Universities of Stanford (USA, 1989 and 1990, Paul Wender) and Harvard (USA, 1992 and 1995, Greg Verdine), and also a visiting professor at the University of Cambridge (UK, 2009) and the Massachusetts Institute of Technology (MIT, USA, 2013).

The research of his group is quite multidisciplinary and focuses on three main topics: metal catalysis, especially concerning the development of methods for the sustainable preparation of bioactive drugs and pharmaceuticals; biomolecular recognition, aimed at addressing the selective modulation of genes with synthetic molecules; and chemical biology at the interphase with catalysis, topic that is mainly focused to the design and development of artificial enzymes based on metals.

In the last 10 years he has published more than 120 scientific articles (out of a total of 200, with an average impact factor above 9), many of which have been reported in "top-notch" chemistry journals like *J. Am. Chem. Soc.* (24 articles), *Angew. Chem.* (22) or *Nature Comm.* (3). He is co-inventor of 21 patents and participated in the establishment of a spin-off company (MD-USE).

In 2009 he was awarded the Janssen Cilag Organic Chemistry Award of the Spanish Royal Society of Chemistry (RSEQ), and in 2015 he was also granted the Gold Medal by the same Society, considered the highest distinction in Chemistry in Spain. In 2013, he received the Gold Medal of the University of Santiago de Compostela (Spain) and an Advanced Grant of the ERC (2014-2020).

He has been selected as a member of the European Academy of Sciences (2016) and of the Gadea Foundation (Spain, 2017), and in 2015 was nominated Spanish head of the section of Organic Chemistry of the Euchems. In 2018, Prof. Mascareñas received the Galician Critics Award in the category of research.

He has been scientific director of the Singular Center of Chemical Biology and Molecular Materials Research (CiQUS) since 2014, having contributed to place this research center as a leading international reference in Chemical Sciences (over 170 members, 6 ERC grants). He has also been the first president and founder of the group of Biological Chemistry of the RSEQ (founded in 2012), which now numbers nearly 300 members.

He has supervised 33 doctoral theses and trained more than 100 master students and undergraduates. 14 former students have gained academic positions worldwide, and 14 others have joined relevant industrial positions, with two of them involved in the foundation of new technologically-based companies.

He has delivered more than 130 guest lectures, including some honour seminars such as the "Serratosa Lecture" (Barcelona, 2016) or the "GDCh-Kolloquium Lecture" (Berlin and Marburg, 2015). He has been president of the scientific or organizing committee of 8 international scientific meetings, and is a member of more than 10 steering committees and foundations.

Nicholas A. Peppas

Nicholas A. Peppas majored in chemical engineering at the National Technical University of Athens (1971) and at MIT (1973). He is currently the Cockrell Family Regents Distinguished Chair with appointments in the Department of Biomedical Engineering, the Department of Chemical Engineering, the Departments of Surgery and Pediatrics in the Dell Medical School, and the Department of Molecular Pharmaceutics and Drug Delivery in the College of Pharmacy, at the University of Texas at Austin. He is also the Director of the Institute for Biomaterials, Drug Delivery and Regenerative Medicine. Professor Peppas has been awarded doctorates *Honoris Causa* from the Universities of Ghent, Parma, Athens, Patras, Ljublijana, National Technical University of Athens, Thessaloniki and honorary professorships from Sichuan University, Peking Medical Union University (China), PLA Hospital and Medical School, Beihang University and Northwestern Polytechnic.

Professor Peppas is a world leader in drug delivery and bio-nanotechnology, biomaterials, nanomaterials, mathematical modeling of biological processes and polymer physics. The multidisciplinary approach of his research blends modern molecular and cellular biology with engineering to analyze complex biological structures and generate the next-generation of medical systems and devices for patient treatment. He set the fundamentals and rational design of biomaterials and drug delivery systems over the past forty years and developed models of drug and protein diffusion in controlled release devices and biological tissues. Using diffusion theory in macromolecular networks, he developed the equations that describe Fickian and non-Fickian diffusion in controlled drug delivery processes. The "Peppas equation" has become the standard method of analysis of drug delivery systems. Similarly, he developed the theoretical framework for the analysis of transport of low solubility drugs (BCS Class III and IV) through crosslinked polymeric carriers (the Peppas-Reinhart theory), ionic hydrogels (the Brannon-Peppas theory), and swellable systems (the Sahlin-Peppas equation).

For the great contributions of his theories and analyses, Peppas has been recognized as the most-cited and highly-published author in drug delivery and intelligent materials. He is ranked as one of the five pharmaceutical scientists in the "Medicine Make Power List". Applications of his theories have had a profound impact in the pharmatheutical field. For example, he developed the novel muco- and bioadhesive systems that interact molecularly with the mucus and tissue and have been able to prolong bioavailability of proteins and peptides in the blood. Using intelligent polymers as early as 1980, Peppas and his group were the first to use such pH-sensitive and temperature-sensitive systems for modulated release of streptokinase and other fibrinolytic enzymes. His fundamental work has led to the new technologies of oral delivery systems for insulin and other proteins. These devices release insulin orally, "protecting" the insulin throughout its transport in the stomach, upper small intestine, and, eventually, blood, and bypassing diabetics' need for several daily injections.

He is the author or co-editor of 37 books, 1,600 publications and 55 international patents. He is a highly cited scientist (124,000 citations, H=164) and has supervised the research of 985 scientists who have worked in his laboratory. Professor Peppas is a member of the National (USA) Academy of Medicine, the National (USA) Academy of Engineering, the American Academy of Arts and Sciences, the National Academy of Inventors, the Academy of Athens (i.e. the Greek Academy), the National Academy of Pharmacy of France, the Royal Academy of Pharmacy of Spain, the Academy of Medicine, Engineering and Sciences of Texas and the International Academy of Medical and Biological Engineering. He is also a member of the US National Board of Materials and Manufacturing, which sets guidelines for the production and manufacture of materials.

He has been recognized with the highest awards from distinguished scientific institutions. Moreover, in 2008, AIChE named him one of the *One Hundred Chemical Engineers of the Modern Era*. Between 2008 and 2016 professor Peppas was the president of the International Union of Societies of Biomaterials Science and Engineering, he was also chair of the Engineering Section of the American Association for the Advancement of Science, chair of the Council of Biomedical Engineering Chairs, president of the Society for Biomaterials (2003-2004) and the president of Controlled Release Society (1987-1988).

As ambassador of his field, he has been a visiting professor at many universities: Geneva, Paris-Sud, Parma, Pavia, Naples Federico II, Free University of Berlin, Santiago de Compostela, Complutense in Madrid, Hoshi, Hacettepe, National and Kapodistrian of Athens, Hebrew University of Jerusalem, Nanyang Technological University and the California Institute of Technology.

María José Alonso

María José Alonso graduated from the School of Pharmacy in 1982 and received a PhD degree from the USC in 1985. From that moment on, she has worked as a postdoctoral research fellow at the University of Paris-Sud, France (1986-87), and as a visiting professor at the University of Angers, France (1989) as well as at the Massachusetts Institute of Technology in 1991-92 and in 2011. She has been full professor of Biopharmaceutics and Pharmaceutical Technology at the University of Santiago de Compostela (USC) since 1998. She served as Vice-Rector of Research and Innovation of the USC (2006-2010). In this position, she built a new cross-disciplinary research organization model, which has deserved the recognition of "Excellence" by the Spanish Government and placed the University of Santiago de Compostela (USC) among the Spanish Campus of International Excellence.

Being widely known for her contributions to nanotechnologies applied to the development of nanomedicines, she was a pioneer in this area in Spain. Her discoveries have led to significant advances in the development of new topical, trans-mucosal and parenteral therapies. In addition to her intense teaching activity, María José has coordinated and participated in a high number of international research consortia financed by the WHO, the Gates Foundation, the World Cancer Research organization, the National Institute of Health (NIH) and the European Commission.

She is the author of over 270 scientific contributions with more than 16,400 cites (H factor 71) and the inventor of 21 patent families, the majority of them licenced to Pharmaceutical companies. Because of the quality of her papers she has been the number one in Spain and among the TOP TEN in Pharmacology worldwide (Times Higher Education).

Academically, she has always combined her research activity with a wide range of educational ones including her participation in several EU PhD educational

European programs (Maria Curie and Erasmus Mundus). She has been the mentor of 36 PhD students and 40 postdocs from all over the world and has received 30 awards, including the King Jaume I Award given to the best researcher in the area of new technologies in Spain, the Maurice Marie Janot Award given by APGI, the EU Society of Pharmaceutical Technology, the CRS Founders Award of the Controlled Release Society and the Josefa Wonenburger and the Castelao Medal, given by the Xunta de Galicia.

She has been a member of several scientific and advisory boards for the most relevant international associations on drug delivery and nanomedicine and the founder the Spanish-Portuguese Chapter of the Controlled Release Society, currently being the President of the International Controlled Release Society. She has also been the counsellor of Innovation Foundation Bankinter and has a word as an adviser for the Spanish Ministry on Sciences and Innovation, as well as to the Spanish Ministry of Health.

She is also a member of the following: the US Academy of Medicine, The Royal National Academy of Pharmacy, the Galician Academy of Pharmacy and the Royal Academy of Sciences in Galicia. Moreover, she is a fellow of the College of Fellows of the American Institute for Medical and Biological Engineering, and of the College of Fellows of the Controlled Release Society. She is also a member of the coordinating committee of the Spanish Platform of Nanomedicine and a member of the European Technology Platform on Nanomedicine and additionally serving on the editorial board of 11 prestigious journals in drug delivery along with being the editor-in-Chief of the of the *Drug Delivery and Translational Research* journal.

Tradition and trendiness

The University of Santiago de Compostela projects its 500-year history into the future. Sinking its roots in Renaissance Europe, it has striven to evolve over this time and become one of the institutions conforming Galician identity. At the beginning of the 21st century, this University has been recognized internationally for its contributions to the dissemination of knowledge and research in such fields as medicine, biotechnology, humanities and scientific innovation.

The roots of this University go back to the closing of the 15th century precisely when the revolutionary technology of the printing press was rapidly spreading across Europe. In 1495, a headmaster in Compostela, Lope Gómez de Marzoa, founds the Studium of Latin Grammar in the monastery of San Pelaio de Antealtares, the so-called Old Study. At the dawn of the 16th century, the Diego de Muros family manages to get the ecclesiastical authorities to back the Study, allowing for the establishment of chairs in both Law and Humanities and, soon afterwards, Canonical Law. Archbishop Alonso III de Fonseca e Ulloa, a humanist in the fullest sense of the Renaissance, undertakes the founding of the Colexio de Santiago in 1521, reinforcing once and for all the pillars of the present-day academic institution. The first Constitution of the University of Santiago is approved in 1555.

In the 19th century, the University undergoes its greatest transformation by incorporating scientific and humanistic fields of study in keeping with the times, along with inaugurating its main building in 1805: the present-day Faculty of Geography and History. Milestones such as the first electrical experiment undertaken in Spain –illuminating this very building in 1851 thanks to a novel electric arc installed by the scientist Antonio Casares– speaks of the vigorous spirit of the University at that time.

Under the groundbreaking auspices of the university, women gained access to fields within society which they had been barred from for centuries. Women first entered this University in 1913, crossing the threshold in a slow but unrelenting process. The Compostelan University was also a place for fostering new ideas for generations of intellectuals, forging new roads for Galician society of the turbulent times of the 20th century and during the Spanish transition, and which gave rise to some of the most outstanding works of Galician culture, some of whose creators were alumni.

The University is divided between two historical cities, Santiago de Compostela and Lugo, both of about 100,000 inhabitants. Compostela has been

a World Heritage Site since 1985 and is the final goal for the different Camiños of Santiago, bringing millions of pilgrims from all over the world since the discovery of the Apostle's remains. Representative of the essence of Galicia, Santiago has always been the political, social and cultural beacon of the Community. On the other hand, Lugo, the ancient Roman Lucus Augusti, preserves intact the Roman wall of the 2nd century and all of the character of inland Galicia.

With five centuries of history behind it, it is no surprise that the University has amassed an artistic heritage unmatched with almost any other Galician institution. All in all, the University's facilities cover over a million square metres with close to 100 buildings, many of which are authentic architectural jewels. Some of these in Compostela recall a brilliant past such as the abovementioned Faculty of Geography and History; the Faculty of Medicine (1901); the San Xerome mansion (rooted in the 15th century), the premises of the Rectory; or the Faculty of Philosophy, 18th century, bordering the old wall of the city. More recent facilities include vanguard designs such as the Faculty of Communication Sciences in Compostela (1999), by Álvaro Siza, or the modern campus of Lugo.

At present, about 25,000 students are studying at the University. In Lugo, the Campus Terra is home to fields of study in economic sustainability and the environment, with a special focus on the field of the agri-food sector, of such importance in the Galician economy. On the other hand, Compostela has two campuses: North Campus and Campus Vida (Life), the latter being International Excellence focusing on the fields of medicine and biotechnology.

The international provenance of a significant part of its student body speaks for the universal vocation of this University. Approximately 1,500 students from other countries are presently registered, making this a cosmopolitan institution, open to the world and willing to absorb and disseminate knowledge world-wide. Each year, this University sends 400 students abroad through the university exchange program Erasmus and receives a similar number from 32 other countries.

The University in Santiago is, therefore, comprehensive inasmuch as offering studies in practically all fields of knowledge and firmly committed to forging ahead as a leader of scientific, economic and social progress. Research is one of the pillars of our institution fostering many diverse initiatives and spin-off companies which transmit the latest scientific contributions to the real economy.

Life within the University of Santiago is not just studies and research alone; each year a wide range of activities are programmed which are not limited to the university community itself, enhancing the cultural (choirs, theater, concerts, literary readings) and sporting (swimming, field and track, tennis, field hockey) programs of both of its home cities.

The University of Santiago de Compostela also expresses its respect for external talent by awarding doctoral *Honoris Causa* to renowned figures from the most diverse fields, from natural sciences to social sciences to literature to the arts. Nearly one hundred prominent persons have been awarded this title so far.

With over 500 years of history and determined to strive forward, the University of Santiago preserves its vitality and the responsibility of an essential institution for the progress of Galicia and the betterment of society.

Gaudeamus igitur

Gaudeamus igitur,

iuvenes dum sumus. *(bis)*

Post iucundam iuventutem,

post molestam senectutem,

nos habebit humus. *(bis)*

Vivat academia,

vivant professores. *(bis)*

Vivat membrum quodlibet,

vivant membra quaelibet,

semper sint in flore. *(bis)*