

CURRICULUM VITAE ABREVIADO (CVA)

DATE	January 20 th , 2025
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Part A. PERSONAL INFORMATION

First name	RAFAEL JOSE		
Family name	RODRIGUEZ TRIAS		
Gender (*)	Male	Birth date	
ID number (NIF)			
e-mail: rafael.rodriguez@unavarra.es	URL Web: https://www.unavarra.es/pdi?uid=491		
Open Researcher and Contributor ID (ORCID) (*)	0000-0003-0086-7547		

A.1. Current position

Position	FULL PROFESSOR		
Initial date	June 14 th , 2019		
Institution	PUBLIC UNIVERSITY OF NAVARRA (UPNA) / INAMAT2		
Department/Center	ENGINEERING		
Country	SPAIN	Teleph. number	
Keywords	Surface engineering, Functional coatings, Nanotechnology,		

A.2. Previous positions (research activity interruptions, indicate total months)

Period	Position/Institution/Country/Interruption cause
2023 -	Subdirector of the Institute of Advanced Materials and Mathematics (INAMAT2) at the Universidad Pública de Navarra.
2019 -	Full Professor (Caterdrático de Universidad) of Materials Science at the Universidad Pública de Navarra.
2014 - 2020	Dean of the School of Engineering at the Universidad Pública de Navarra.
2001 - 2019	Associate Professor (Profesor Titular) at the Engineering Department at the Universidad Pública de Navarra.
1993 - 2000	Assistant Professor (Profesor Asociado) at the Engineering Department at the Universidad Pública de Navarra.
1991 - 2013	Head of the Surface Engineering laboratory at the Asociación de la Industria Navarra (AIN) technological center.
1989 - 1991	Researcher at the Asociación de la Industria Navarra (AIN).
1985 - 1989	Predoctoral research grant holder at University of Zaragoza, Sciences Faculty.

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Programme of General Management (PDG)	IESE (Spain)	2005
PhD in Physics	Universidad de Zaragoza (Spain)	1991
Bachelor/Master (<i>Licenciado</i>) in Physics	Universidad de Zaragoza (Spain)	1983

Part B. CV SUMMARY (*max. 5000 characters, including spaces*)

Rafael Rodríguez Trías obtained his PhD in physics at the University of Zaragoza (1991). During his postdoctoral training, he made stays in the Harwell laboratories and Imperial College London (UK) as well as in the LMP of the University of Poitiers (France). Subsequently, he has maintained close collaborations, in addition to these centres, with the Danish DTI and the University of Modena in Italy.

He joined the UPNA in October 1993 becoming Full Professor in 2019. Until 2013, he has shared this activity with the management of a research group in Surface Engineering and Nanostructured Materials at the AIN technology centre. Both, his teaching and his research has been focused on materials technologies and, especially, on surface engineering (surface

modification processes, plasma treatments, coatings, nanostructuring and functionalization of materials for tribological, biomedical, electronic, optical and clean energy applications). He is the author of more than 110 publications in international journals (SCOPUS h = 23) and more than 60 communications to congresses and conferences. He has accredited **5 research six-year periods (sexenios) and one of technology transfer**. He has participated in more than 15 projects of the National R & D Plan, more than 20 European Projects, and more than 50 projects with industrial companies, including two CENIT projects. He has been Academic Director of the Master of Materials Engineering and Manufacturing (2007-2010) and the Dean of the School of Industrial and ICT Engineering (2014-2020).

Main scientific contributions:

In 1990 he set up (within AIN) the first national center dedicated to the industrial applications of ion implantation technology, installing three ion implanters (with and without mass separation and a third by plasma immersion). After the year 2000, he expanded the center's activity to PVD coatings, incorporating electron beam and electric arc evaporation equipment, as well as magnetrons for sputtering processes. In parallel, a complete surface and tribological characterization laboratory was created (electron microscopy, X-ray diffraction, GD-OES analysis, AFM, nanoindentation, friction and wear testing). The activity of this center gave rise to developments of great interest and applicability for the national companies, as well as from the point of view of knowledge generation, in particular:

- Tribological and anticorrosion behaviour of groups IV (Ti, Zr, Hf), V (V, Nb, Ta) and VI (Cr, Mo, W) and their alloys modified by ion implantation.
- Development of ultrahard PVD coatings based on nanocomposites and nano-multilayers.
- Development of bactericide surfaces by ion implantation and PVD coatings by means the doping with Cu and Ag ions and titanium oxide nanoparticles.

Since its full incorporation into the UPNA he has launched a new line of surface functionalization based on soft coating techniques such as electrospinning or sol-gel and LbL by deep coating. This new line has allowed us to work in the following fields:

- Superhydrophobic and anti-ice coatings for aeronautical applications.
- Biocide coatings for medical implants and devices.
- Photocatalytic coatings for medical and environmental applications.

Contributions to society:

During his period as head of AIN's surface engineering area, the group grew to more than 20 researchers and an annual turnover of more than 2 million euros, a third coming from national and European companies, a third from applied projects and another third of basic research projects, all of them obtained in competitive competition. More than 500 companies have benefited from the technologies developed since 1990. Likewise, 5 patents were developed, one of them European. At the same time, he has carried out extensive dissemination work, with more than 30 publications in industrial dissemination magazines and the edition of a technological bulletin (60 issues between 1994 and 2014).

Contributions to the training of young researchers

During his period as head of AIN's surface engineering area, more than 40 researchers were trained (50% women), half of whom remained on the staff and the rest, after periods of 2 years on average, joined companies or technology centers. Young international researchers (Portugal, Italy, USA, China, India) have also been integrated in periods of a few months. After going full-time to university, the group he coordinates has hired more than 15 young researchers since 2014, half of whom are doing a doctoral thesis as the start of an academic career and the rest have gone or will go to technology centers or to industrial and technological companies.

In total, he has directed 8 doctoral theses (plus another 2 in progress) as well as more than 40 end-of-study projects (undergraduate and master's degrees).

Finally, it is worth highlighting his activities as a project evaluator for the AEI, as a reviewer of scientific journals (more than 50 registered by Publons) and as assistant editor of the HELIYON magazine since 2019.

Part C. RELEVANT MERITS (sorted by typology)

C.1. Publications (10 selected publications corresponding to the last 10 years)

Adrián Vicente, Pedro J. Rivero, Cleis Santos, Nadine Rehfeld, **Rafael Rodríguez**. Comparative study of electrospun PDMS fibers as a substitute for fluorine-based polymeric coatings for hydrophobic and icephobic applications. *Polymers* (2024), 16, 3386, 1-12.

Leire Murillo, Pedro J. Rivero, Xabier Sandua, Gumer Pérez, José F. Palacio, **Rafael Rodríguez**. Antifungal Activity of Chitosan/Poly(Ethylene Oxide) Blend Electrospun Polymeric Fiber Mat Doped with Metallic Silver Nanoparticles. *Polymers* (2023), 15, 3700, 1-18.

Julio Mora, Paloma García, Francisco Carreño, Miguel González, Marcos Gutiérrez, Laura Montes, Victor Rico Gavira, Carmen López-Santos, Adrián Vicente, Pedro Rivero, **Rafael Rodríguez**, Silvia Larumbe, Carolina Acosta, Pablo Ibáñez-Ibáñez, Alessandro Corozzi, Mariarosa Raimondo, Rafal Kozera, Bartłomiej Przybyszewski, Agustín R. González-Elipé, Ana Borrás, Francisco Redondo, Alina Agüero. Setting a comprehensive strategy to face the runback icing phenomena. *Surface & Coatings Technology*, (2023), 465, 129585, 1-13.

Adrián Vicente, Pedro J. Rivero, Unai Urdiroz, Paloma García, Julio Mora, José F. Palacio, F. Javier Palomares, **Rafael Rodríguez**. Novel Design of Superhydrophobic and Anticorrosive PTFE and PAA + β - CD Composite Coating Deposited by Electrospinning, Spin Coating and Electro spraying Techniques. *Polymers* 14 (2022) 4356, 1-16.

Ainhoa Albistur, Pedro J. Rivero, Joseba Esparza, **Rafael Rodríguez**. Evaluation of the Photocatalytic Activity and Anticorrosion Performance of Electrospun Fibers Doped with Metallic Oxides. *Polymers*, (2021), 13, 2011, 1-18.

Javier Osés, Gonzalo García Fuentes, José Fernández Palacio, Joseba Esparza, José Antonio García and **Rafael Rodríguez**. Antibacterial functionalization of PVD coatings on ceramics. *Coatings* 8 (2018) 197, 1-12.

Antibacterial response of titanium oxide coatings doped by nitrogen plasma immersion ion implantation. Joseba Esparza, Gonzalo García Fuentes, Rebeca Bueno, **Rafael Rodríguez**, José Antonio García, Ana Isabel Vitas, Victor Rico, Agustín R. González-Elipé. *Surface and Coatings Technology* 314 (2017) 67-71.

Juan Deyo Maeztu, Pedro J. Rivero, Carlos Berlanga, David M. Bastidas, José F. Palacio, **Rafael Rodríguez**. Effect of graphene oxide and fluorinated polymeric chains incorporated in a multilayered sol-gel nanocoating for the design of corrosion resistant and hydrophobic surfaces. *Applied Surface Science* (2017), 419, 138-149.

J.J. Roa, **R. Rodríguez**, V. Lamelas, R. Martínez, E. Jiménez-Piqué, L. Llanes. Small scale fracture behaviour of multilayer TiN/CrN systems: Assessment of bilayer thickness effects by means of ex-situ tests on FIB-milled micro-cantilevers. *Surface and Coatings Technology* (2016), 308, 414-417

J. Osés, J.F. Palacio, S. Kulkarni, A. Medrano, J.A. Garcia, **R. Rodriguez**. Antibacterial PVD coatings doped with silver by ion implantation. *Applied Surface Science* (2014), 310, 56-61.

C.2. Congress, (all of them invited oral presentations given by Rafael Rodríguez)

5th European Topical Conference on Hard Coatings ETCHC-5 / RIVA 7 (Caparica, Portugal, Junio 2008). *New trends in decorative and functional coatings*.

4th European Topical Conference on Hard Coatings ETCHC-4 / RIVA 6 (Salamanca, Junio 2006). *Nanostructured PVD coatings on the verge of industrial applications*.

SMMIB'2005: International Conference on Surface Material Modification by Ion Beams (Kusadasi, Turquía, Septiembre 2005). *The development of competitive applications of ion implantation treatments*.

ASEVA WS-15 Recent Advances in Thin Films and Hard Coatings (Avila, Julio 2004). *PVD coatings vs. Ion Implantation treatments: common problems and diverse applications*.

VII Congreso Nacional de Materiales (Madrid, Octubre 2002). *Caracterización mecánica y tribológica de superficies modificadas a micro y nano escala*.

SMMIB'2001: International Conference on Surface Material Modification by Ion Beams (Marburg, Alemania, Septiembre 2001). *Niche sectors for economically competitive ion implantation treatments*.

C.3. Research projects, (projects of the last 15 years relevant to the aforementioned lines of which he has been the principal investigator).

Investigación de la tecnología de Terahercios como herramienta de apoyo en el desarrollo y fabricación de nuevas tecnologías de almacenamiento energético (TERALMA). Dirección General de Industria, Energía y Proyectos Estratégicos S3 - Gobierno de Navarra. Rodríguez Trías, Rafael José (**Investigador Principal**). UPNA + DAS-NANO. 01/07/2022-31/05/2024. 169.170 €.

Utilization of aluminium bearing raw materials for the production of aluminium metal, other metals and compounds (ABtomat).– Ref.: 0011-3998-2021-000006. European project ERA-MIN + Gobierno de Navarra. Rodríguez Trías, Rafael José (**Investigador Principal**). UPNA + 11 partners (CZ, SE, TR, EE). 01/02/2022-31/01/2025. 188.500 €.

Sistema PVD HiPIMS & PECVD. Equipo híbrido de deposición de recubrimientos capaz de combinar las técnicas de Deposición Física de Vapor (PVD), Deposición Química de Vapor asistida por Plasma (PECVD) e Implantación iónica. Ref. 0011-1508-2022-000011. Departamento de Universidad, Innovación y Transformación Digital - Gobierno de Navarra. Rodríguez Trías, Rafael José (**Investigador Principal**). 01/01/2022-31/12/2022. 360.000 €.

RTI2018-096262-B-C41: Multidisciplinary approach for the implementation of new technologies to prevent accretion of ice on aircrafts (MAI-TAI). Ayudas del Programa Estatal de Investigación, Desarrollo e Innovación Orientada a los Retos de la Sociedad. Convocatoria 2018. Rodríguez Trías, Rafael José (**Investigador Principal**). UPNA + AIN + INTA + AIMPLAS. 01/01/2019 - 31/12/2021. 102.850 €.

2018/PC007-008 + 2019/PC099-100. Desarrollo de recubrimientos fotocatalíticos con capacidad de producción de hidrógeno a partir de la hidrólisis del agua (PHOTO-ACTIVE). Gobierno de Navarra, Plan de Centros, Convocatoria 2018. Rodríguez Trías, Rafael José (**Investigador Principal**). UPNA + AIN. 01/02/2018 - 30/11/2019. 26.000 €.

CAN2014 (03764) Obtención de recubrimientos protectores con funcionalización bactericida para materiales empleados en instrumental quirúrgico e implantes médicos (BIOSILVER). Fundación CAN. Convocatoria 2014. Rodríguez Trías, Rafael José (**Investigador Principal**). UPNA + AIN. 01/01/2016 - 31/12/2016. 25.000 €.

TRA2013-48603-C4-1-R. Recubrimientos contra la Formación de Hielo y la Erosión en Elementos Aerodinámicos de Aeronaves.. PJI. Ayudas del programa Estatal de Investigación, Desarrollo e Innovación Orientada a los Retos de la Sociedad. Convocatoria 2013. Rodríguez Trías, Rafael José (**Investigador Principal**). UPNA + AIN + INTA + AIMPLAS. 01/01/2014 - 31/12/2017. 72.600 €.

ENE2009-14750-C05-04: Desarrollo de recubrimientos funcionales por PVD sobre placas bipolares de Al para pilas de combustible (PEM) (EPICO). Ayudas del Plan Nacional de Investigación. Convocatoria 2009. Rodríguez Trías, Rafael José. AIN. 01/01/2009 - 31/12/2012. 76.000 €. **Investigador Principal**.

CONSOLIDER–CSD-2008-0023: Funcionalización superficial de materiales para aplicaciones de alto valor añadido (FUNCOAT). Programa INGENIO 2010 – CONSOLIDER. 120.000 €. **Investigador Principal** del subproyecto de AIN (2008-2013).