



AYUDAS RAMÓN Y CAJAL CONVOCATORIA 2016

Turno de acceso general

Nombre: RIUS SUÑE, GEMMA
Referencia: RYC-2016-21412
Área Científica: Ingeniería Eléctrica, Electrónica y Automática
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Título:

Nanopatterning and nanomaterials for advanced electronic devices

Resumen de la Memoria:

Gemma Rius enables nanostructures and nanodevices by combination of advanced nanopatterning with novel nanomaterials. Brief chronology of her research career is as follows.

Predoctoral phase 2002-08 Spain. Appointment at IMB and realization of her doctoral thesis: electron beam lithography (EBL) for the fabrication of electronic and mechanical nanodevices. She is the first expert at IMB in EBL, which is applied to Si, C nanotubes (CNT) and graphene. She masters atomic force microscopy (AFM) advanced electrical modes and focused ion beam (FIB).

Postdoctoral phase 2009-12 Japan. Appointments at Tohoku University and Toyota Technological Institute, TTI. At Tohoku University she joins the Nanoprobe Group on nuclear spin electronics. At TTI, she develops AFM probes based on CNTs and gets hands-on experience in syntheses of C nanomaterials. Marketable devices are achieved.

Independent researcher phase 2012-17 Japan & Spain. Appointment as assistant professor at NITech and return to IMB as Marie Curie Fellow, as autonomous researcher. Increase of her responsibilities includes teaching, supervising, project management - funds RAWINTS project. Two research lines are active: graphene and other 2D materials plus nanopatterning for advanced electronic, photonic and magnetic devices; and enabling flexible or autonomous electronic devices/sensors, e.g. by graphene plus ZnO and ink-jet. Her research line and achievements are schematized as follows.

Executed all EBL fabrication at IMB for nano mechanical and electronic devices for 6 years: Si nanomechanical devices for molecular recognition and mass sensing for several EU projects. Prototypes of monolithic nanoresonators were integrated in CMOS and e-exposure compatibility issues studied on MOS devices.

Pioneering work on CNT electronic devices such as the first CNT-FET in Spain, fabricated by Gemma Rius at IMB. The effect of e-beam on CNT devices could elucidate a transient nature of damage events (Microelectr. Engin. 84 1596 (2007)). NanoCs and SiC technology at IMB coordinated for the synthesis of epitaxial graphene (EG) on SiC substrates: graphene ribbons (Appl. Phys.Lett. 93, 263102 (2008); Phys.Rev. B 80 125410 (2009)) and selective EG deposition (Appl.Phys. Lett. 93 123503 (2008)). IMB EG-SiC technology generated GPNT spin-off.

FIB nanopatterning is valid if charged beam energy and dose are minimized and kept apart from sensitive areas, transistors (Microelectr. Engin. 86, 1046 (2009)). Ga+ implantation of Si could be used as a robust etching mask or an ultrathin structural layer (J. Vac. Sci. Technol. B 27, 2691 (2009)).

She demonstrated FIBID for CNT-FET fabrication (Microelectr. Engin. 86, 892 (2009)) and synthesis of patterned graphene directly on insulators at TTI (J. Vac. Sci Technol. 30 (3) 03D113 (2012)), induced by Ni (Jap.J.Appl.Phys. 53 02BC22 (2014)) and Fe (Nanofab. 1 8 (2014)). AFM electrical modes monitored e.g. the transitory charging effects on CNTFETs (Microelectr. Engin. 85 1413 (2008)). She established novel AFM nanopatterning for PMMA (Nanotech.16 1016 (2005)) and cutting of EG ribbon on SiC to tune electrical conduction (J. Vac. Sci. Technol. B 27 3149 (2009)). At TTI, she worked on CNT-AFM probes (J. Vac. Sci. Technol. B 28 1148 (2010), IET Micro Nano Letters 7 343 (2012)) and CNF probes for high resolution LAO-AFM of Si (Beilstein J Nanotech. 6 215 (2015)).

Resumen del Currículum Vitae:

Gemma Rius has been working in Nanotechnology-related topics since graduating in Physics. After 14 years, she has her own research line on advanced nanostructures and nanodevices, based on the smart combination of nanopatterning with nanomaterials, i.e. merging top-down and bottom-up methods.

She has realized pioneering works in nanodevice fabrication in Spain, including silicon mechanical nanostructures, integration of Si nanomechanical devices on CMOS and first carbon nanotube (CNT) field effect transistor in 2004. She executed the establishment of nanofabrication processes at the Institute of Microelectronics of Barcelona (IMB). During her post-doctoral stay in Japan, she has developed internationally competitive works in graphene synthesis and nanoelectronics. Accomplishments include the development of novel functional nanodevices, such as CNT and carbon nanofiber functionalized probes for atomic force microscopy (AFM) or graphene-based supercapacitors and batteries. Also remarkable, the application of original nanopatterning methods based on either AFM advanced modes or fine ion beams.

She is author of 60 publications, with relevant impact in peer reviewed journals (i-10 index 17), including several review articles and book chapters. She is currently editing a book on epitaxial graphene on SiC and has several patents in process. Her works have been presented > 15 times as invited talks at scientific conferences. She has contributed to 12 international and national funded projects. Since last 5 years, she is leading her independent research lines and funded projects management.

After a long experience abroad in Japan and partially as a result of it, she becomes technical advisor for IMB spin-off company,



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GrapheneNanotech (GPNT), as well as involved in the European Graphene Flagship Initiative. She is engaging scientific committees and outreach management: representative for IMB at GrapChina conference, boosting IMB participation in CSIC initiative on quantum technologies, etc. She promotes strategic collaborations, within the IMB and internationally, as well as projects, e.g. for Horizon 2020 or ESA, and encouraging academics and industry cooperation.

She has been research supervisor for undergraduate and graduate students of UAB, and regionally, as well as visiting students from Japan and China. She acts as a reviewer for several journals, and has evaluated research projects for the EU commission, US NSF and regional institutions.



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Nombre: LAGE NEGRO, EDUARDO
Referencia: RYC-2016-21125
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Título:

Need Driven technology development in Biomedical Engineering

Resumen de la Memoria:

Dr. Lage's doctoral research was focused on the design and development of innovative medical imaging systems for Positron Emission Tomography (PET), Single Photon Emission Computed Tomography (SPECT), X-Ray Tomography (CT), and multimodality scanners implementing combinations of these techniques (i.e. PET/CT). Dr. Lage transferred all of these systems to industry and some of them have been commercialized worldwide by several companies.

During his post-doctoral stage, Dr. Lage developed and co-directed two international research projects, both involving several top USA and Spain research institutions. Although these two projects were in different clinical fields, both share a common feature which is the base for any research performed by Dr. Lage - the research is carefully designed and driven to address an unmet clinical need.

The first project, titled "multiplexed PET", aims to develop a technology to enable current PET scanners to image more than one biological parameter in a single scan. This breakthrough would make it possible to simultaneously measure interlinked disease processes (e.g. metabolism, hypoxia, or the presence or absence of specific tumor receptors) which is unfeasible with current technology. The integration of this technology into current clinical systems holds the potential to enable new molecular imaging applications including early treatment and response assessment for cancer patients, and even the possibility of objectively tailoring cancer therapy according to the patient's unique profile (personalized medicine). Towards this, the project team has demonstrated the technology in preclinical scanners and obtained competitive funding to implement the technology in human scanners.

The objective of Dr. Lage's second research line is to develop a low-cost portable device to easily obtain eyeglasses prescriptions in low-resource settings. There is a critical need for tools that increase the accessibility of eye care to address the most common cause of vision impairment - uncorrected refractive errors. Due to the global shortage of eye care professionals, it is often difficult, particularly in low-resource settings, to obtain accurate prescriptions for eyeglasses that would effectively correct refractive errors and restore good vision. During this project we created and patented a technology that enables low-cost accurate wavefront aberrometry in a handheld form-factor. The device has been clinically validated in more than 1200 patients around the world and was demonstrated to have excellent performance for measuring refractive errors. As a result of this project Dr. Lage cofounded PlenOptika, Inc and secured funding for the development and commercialization this technology.

Apart from the 2 previous research lines, Dr. Lage's current research is focused on the development of a new wearable vision simulation device that allows the patient, prior to implantation, to naturally see how intra-ocular lenses (including multifocal lenses) will affect their vision. This technology will enable, for the first time, patients to select the lenses which better fit their perception of the reality before cataract or presbyopia surgery, and thus opens up new market opportunities for multifocal intra-ocular lenses. As a result Dr. Lage has cofounded the company 2Eyes Vision SL in partnership with VioBio Lab (CSIC).

Resumen del Currículum Vitae:

Eduardo Lage graduated with a B.S. in Electrical Engineering from the Universidad of Alcala (Madrid) in 2006, carried out his Doctoral work at the Gregorio Marañón Hospital (Madrid) and earned his Ph.D. in Medical Imaging from the Universidad Politécnica of Madrid in 2010. Afterwards, Dr. Lage was awarded with an M+Visión Research Fellowship at the Massachusetts Institute of Technology from a highly competitive process (10 fellowships, > 400 applicants worldwide, EU 7th FP). During this Fellowship (2011-2014), he proposed, led and obtained funding from the EU for two lines of research that were carried out in partnership with several top research institutions in the USA and Spain.

The first research line successfully resulted in 13 conference presentations, numerous invited presentations at prestigious research centers (e.g., Harvard Medical School or The Memorial Sloan-Kettering Cancer Center), 4 international patent applications and 2 published papers (3 more in preparation). Importantly, the project also was awarded NIH funding (R21 Grant, funding rate < 9%) to implement the technology in human systems.

The second research line successfully resulted in 3 conference presentations, numerous invited presentations at prestigious optics research centers (e.g., CSIC or Wellman Center for Photomedicine), 2 published high-impact papers, 2 international patents applications, and the formation of a spin-off company (PlenOptika, Inc., Boston). Dr. Lage is the Chief Technology Officer of PlenOptika, which has been recognized with 12 international awards and more than \$1.5 Million in non-dilutive funding from different sources (e.g. the US and Indian governments). In 2014, Dr. Lage obtained a 3-year EU Cofund Fellowship (Marie Curie Actions, 7th FP) which has allowed him returning to Spain as a researcher at the University Autónoma of Madrid (UAM). From that time onward, Dr. Lage is directing his own research lab (currently composed by 5 Biomedical Engineers and 1 MD), has been designated Honorary Professor at the UAM Medical School, and has also started up a new medical device company (2 Eyes Vision SL) that has obtained more than 1M Euros in funding from competitive sources.



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During his career, Dr. Lage has participated in 17 R & D projects being PI in 5 of them. As a result, he has transferred a total of 6 different medical technologies to 7 different companies (2 National, 5 International). He has been invited speaker 16 times during the last 4 years and his research has been covered by press in several occasions (including an article in "The Boston Globe" and an interview by the Spanish newspaper "El Mundo").

Dr. Lage has published 13 peer-reviewed journal articles, 58 conference papers (42 international) and prepared numerous scientific or technical reports for 4 different companies. These journal publications appear in 6 different journals, 46% of which are in the first quartile (100% within 1st and 2nd quartile), and 42.5% of all his publications are as first or last author. He has supervised 6 completed Bachelor/Master projects and is currently supervising 4 more. He has also accumulated more than 100 hours of University teaching, organized 2 national conferences, and is a reviewer in three of the top Journals of his field. He has completed several research stays at Aravind eye Hospital & Aurolab (India), Brigham & Women's Hospital (USA), Instituto de Optica Daza de Valdes (Spain), and the National University of Costa Rica.



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Nombre: ANDUJAR SANCHEZ, DIONISIO
Referencia: RYC-2016-20355
Área Científica: Ingeniería Eléctrica, Electrónica y Automática
Correo Electrónico: dionisioandujar@hotmail.com

Título:

Artificial Perception Systems and Robotics for Sustainable Agriculture. Site-Specific Pest Management

Resumen de la Memoria:

After several years of working experience as a post-doc, I started to develop a new research-line in the Centre for Automation and Robotics (CAR-CSIC) based on exploiting the advantages of depth cameras, new on-ground sensors and innovative processing image analysis methods for precision agriculture purposes, with the main objective to propose new strategies that will optimize the agricultural application of inputs and autonomous guidance of agricultural vehicles. I have been the Principal Investigator of 4 projects and 1 contract with a company, which help me to carry out my own investigation. Two projects were run to develop an innovative tool for non-chemical pest control by the development of electrical harrow for weed control. The third one, funded by FAME Foundation, allowed me to carry my own research line regarding weed sensing in Germany during my postdoctoral stage. The last one will cover the research for forage sensing using depth cameras in Norway during 2017. During 2017, a project regarding aerial and terrestrial robotics for tomato monitoring will be executed by funds of Tomates del Guadiana. In addition, I have been involved as a researcher in another Spanish projects and a 7FP European Project titled "Robot fleets for highly effective agriculture and forestry management (RHEA)". My advances in up-to-date projects have already been published in several high-impact journals. In total, I have participated in 11 research projects (6 International and 5 National). I am the co-director of two Doctoral Theses, of which one was defended in November 2016 (FPI) and the other one is on-going at the CAR-CSIC. I did international stays at the University of Hohenheim, Stuttgart (as a post-doc 2 years), University of California and currently at NIBIO (Norway) and in Copenhagen and Stuttgart (as a pre-doc student), which produced several papers published in prestigious Q-1 journals. I am assessor of companies such as Acciona and Agco. I have been invited as a chairman in two conferences, as invited speaker in two conferences and as a speaker in seminars at the University of Hohenheim, CSIC, the Aarhus University and NIBIO. I am the author of 4 patents (+2 sent), and the unique author of 2 of them, two under exploitation. I am the coordinator of an European Network and I am associate editor of the Spanish Journal of Agricultural Research. I received 8 prizes during my degree and research career. I have wide experience in teaching in German, English and Spanish. To date, my scientific activity has led to 32 papers (plus 2 under review) published in SCI journals (24 in Q-1), 1 book, 9 conferences papers in ISI-Proceedings, 7 papers published in non-SCI journals, and 53 contributions to national and international congresses.

Resumen del Currículum Vitae:

Nombre: Dionisio Andújar Sánchez
Categoría profesional: Investigador Posdoctoral
Centro/Instituto: CENTRO DE AUTOMÁTICA Y ROBÓTICA

LINEAS DE INVESTIGACIÓN: Agricultura de precisión, Robótica para agricultura, Sensores en agricultura, Procesamiento de imágenes y reconstrucción 3D, Reconocimiento de estructuras naturales, Detección de malas hierbas, Modelización espacio-temporal, Sistemas de Información Geográfica.

RESERVA RAMÓN Y CAJAL CONVOCATORIA ANTERIOR (2015)
CONTRATO MINECO (JdC)
BECA POSDOCTORAL FUNDACIÓN ALFONSO MARTÍN ESCUDERO
AYUDA PREDOCTORAL DE FORMACIÓN DE PERSONAL INVESTIGADOR (FPI)

TOTAL PROYECTOS DE INVESTIGACIÓN: 15
Como Investigador Principal: 4 (150.400€)
Como participante: 11
Nacionales: 5
Internacionales: 6 (1FP7)
CONTRATOS CON EMPRESAS (como Investigador Principal): 1 (290.000€)

REDES EUROPEAS: 1 (Coordinador)

TOTAL ARTÍCULOS ACEPTADOS EN REVISTAS: 39
Publicaciones en revistas indexadas en JCR Totales: 32 artículos (30 publicadas + 2 aceptadas) (Primer autor: 18)
Divididos por cuartiles en:



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Nº de publicaciones en el primer cuartil: 24 (12 primer autor)
Nº de publicaciones en el segundo y tercer cuartil: 4 (2 primer autor)
Nº de publicaciones en el cuarto cuartil: 4 (4 primer autor)
Publicaciones en revistas No indexadas en JCR Totales: 7 artículos (Primer autor: 3)

TOTAL TRABAJOS EN CONGRESOS: 53 (30 Intenacionales)
ISI Proceeding (congresos de especial relevancia): 9 (Primer autor: 4)
Actas con ISBN: 31 (Primer autor: 12)
Congresos con actas sin ISBN: 8 (Primer autor: 4)
Congresos sin actas: 5 (Primer autor: 4)

LIBROS COMPLETOS: 1

PATENTES: 6 Patentes (4 concedidas; 2 Transferidas)

TOTAL TRABAJOS DIRIGIDOS:
Tesis: nº de tesis dirigidas: 2 (1 FPI defendida + 1 en desarrollo)
Trabajo Fin de Máster dirigidas: 1
Trabajos Fin de Carrera dirigidos: 2

ESTANCIAS :
Posdoctorales: 3 (31 meses)
Predoctorales: 2 (4.5 meses)

DOCENCIA
Colaboración: 3 Universidades (UPM, Hohenheim, NIBIO) e Instituto de Salud Carlos III para impartir cursos de posgrado.
Docencia impartidos: 4 (24 horas nacional + 195 horas internacional)
Cursos de Especialización impartidos: 2 (40 horas)

GESTIÓN DE I+D
Convenios y estudios con empresas: 6 (4 internacionales).
Asesoramiento a empresas: 4 (2 internacionales)
Organización de actividades de I+D: 6
Participación en actividades de I+D: 3
Asistencia a cursos: 8
Editor en revista JCR: 1
Becas obtenidas: 4

PREMIOS: 8