



# UC3M R&D IN THE materials area

RESEARCH ACTIVITY, TECHNOLOGIES,  
PATENTS, INFRASTRUCTURES  
AND OTHER UC3M CAPABILITIES

**uc3m**

Universidad **Carlos III** de Madrid

Vicerrectorado de Política Científica

Servicio de Apoyo al Emprendimiento y la Innovación





The Entrepreneurship and Innovation Support Service (SEI) of the Universidad Carlos III de Madrid wants to present the potential of the university in this "knowledge map" through the research areas developed in the frame of R&D projects, both national and international, patents and other results of UC3M investigators, in the Materials Area.

The global knowledge obtained, the experience of collaborating with the industry, the existence of infrastructures and proper laboratories and, above all, the multidisciplinary nature of UC3M are characteristics that provide an added value so that our support towards the innovation of institutions, big companies and SMEs has an integral quality.

We invite you to deepen the knowledge of the UC3M and to collaborate in new R&D and innovation projects.

**Entrepreneurship and Innovation Support Service**  
**Universidad Carlos III de Madrid**

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R&D GROUP	LINES OF RESEARCH	RESEARCH PROJECTS	TECHNOLOGICAL OFFER / OTHERS
MATERIALS SCIENCE AND ENGINEERING AND CHEMICAL ENGINEERING			
<p><b><u>Behaviour of materials in service</u></b></p> <p><b>Group head:</b> <b>Miguel Ángel Martínez Casanova and Francisco Javier Velasco López</b></p>	<ul style="list-style-type: none"> <li>• Surface Treatments and Adhesion: Paints and Adhesives</li> <li>• Failure Analysis and Design of Solutions for those materials that have had a problem at some point in their service life</li> <li>• Tribology: Friction and Wear</li> <li>• Corrosion: improvement in durability of metals and structures with metallic components</li> </ul>	<p><b>European Projects:</b></p> <ul style="list-style-type: none"> <li>• Technology transfer from Key Enabling Technologies (KETs) to market applications of the Creative Industry relating to industry materials for Habitat in southeastern Europe (KrEaTive Habitat)</li> </ul> <p><b>R&amp;D National Plan Projects:</b></p> <ul style="list-style-type: none"> <li>• Design and optimization of structures of buses and coaches using structural adhesive bonds with dissimilar materials</li> <li>• PMCS surface treatments using physical and/or chemical techniques for improving the behaviour in service in structural adhesive bonds</li> </ul> <p><b>UC3M Funding:</b></p> <ul style="list-style-type: none"> <li>• Strategic Action in Corrosion and protection of materials</li> <li>• Strategic Action in Design and optimization of structural adhesive bonds with dissimilar materials subjected to vibrations and impacts for automotive applications</li> </ul>	<p><b>Experience and Capabilities:</b></p> <ul style="list-style-type: none"> <li>• Surface Treatments and Adhesion: Paints and Adhesives</li> <li>• Improvement in the adhesion of paints and adhesives</li> <li>• Behaviour and reliability of tough elastic adhesives in aggressive media and their possible use in vibration- and impact-resistant structural bonds.</li> <li>• Verification of mechanical characteristics in adhesive bonds by using statistical techniques</li> <li>• Surface plasma treatments to improve adhesion</li> </ul> <p><b>Failure Analysis and Design of Solutions:</b></p> <ul style="list-style-type: none"> <li>• Optimization of manufacturing processes, chemical treatments and thermochemical treatments in metallic materials</li> <li>• Optimization of manufacturing processes by means of bonding techniques with adhesives.</li> <li>• Design of materials with new features and high added value</li> </ul> <p><b>Tribology: Friction and Wear:</b></p> <ul style="list-style-type: none"> <li>• Preparation of new anti-wear materials</li> <li>• Increase in composite hardness</li> </ul>

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MATERIALS SCIENCE AND ENGINEERING AND CHEMICAL ENGINEERING			
<p><u>Behaviour of materials in service</u></p> <p>Group head: Miguel Ángel Martínez Casanova and Francisco Javier Velasco López</p>		<p><b>Private Funding:</b></p> <ul style="list-style-type: none"> <li>• Characterization of protective coatings to evaluate protection against corrosion provided by metallic substrates</li> <li>• Study of materials with high thermal conductivity and development of sintered bronze technology for the molds of expanded polypropylene</li> <li>• New materials and processes in electrical appliances</li> <li>• Plasma treatments of polymeric materials</li> </ul>	<p><b>Corrosion:</b></p> <ul style="list-style-type: none"> <li>• Corrosion control in reinforced concrete structures</li> <li>• Behaviour of new materials as reinforcement in concrete</li> <li>• Study of anticorrosive coatings</li> <li>• Localized corrosion of stainless steel components in various media</li> <li>• Processing and optimization of the behaviour of porous metals (manufactured by powder metallurgy) in aggressive environments</li> <li>• Characterization of high-temperature direct oxidation processes</li> </ul> <p><b>Equipment:</b></p> <ul style="list-style-type: none"> <li>• State-of-the-art equipment to deal with problems from a number of viewpoints: structural, mechanical, microstructural, corrosion and surface, wear, etc.</li> </ul>

R&D GROUP	LINES OF RESEARCH	RESEARCH PROJECTS	TECHNOLOGICAL OFFER / OTHERS
MATERIALS SCIENCE AND ENGINEERING AND CHEMICAL ENGINEERING			
<p><b><u>Polymer and interface in composite materials</u></b></p> <p><b>Group head:</b> <b>Javier González Benito</b></p>	<ul style="list-style-type: none"> <li>• Characterization of materials on the nanoscale</li> <li>• Physicochemical characterization of materials</li> <li>• Design and implementation of new, multifunctional nanocomposites with a thermoplastic matrix (electrical, mechanical and thermal characterization)</li> <li>• Probe and label interfaces and fluorescence</li> <li>• Antibacterial thermoplastic nanocomposites</li> <li>• Thermoplastic nanocomposites with special electrical properties</li> <li>• Plastic materials with potential biomedical and food and agriculture industry applications (antibacterial, scaffolds)</li> <li>• Mixtures of polymers and composites</li> <li>• Blow spinning solution</li> <li>• Use of high energy mechanical milling as a method for dispersing nanoparticles in thermoplastic matrices</li> </ul>	<p><b>R&amp;D National Plan Projects:</b></p> <ul style="list-style-type: none"> <li>• New nanocomposites with special electrical properties and development of new characterization methods: Nano-piezo-deformation and nano-heat deformation</li> <li>• Antimicrobial Thermoplastic Nanocomposites with Potential Applications in the Food and Agriculture industry (ANTIMICROPLAST)</li> <li>• New nanocomposites with special electrical properties and development of new characterization methods: nano-piezo-deformation and nano-heat deformation</li> <li>• Prevention of diseases with Antimicrobial Materials in the food and health sectors</li> </ul> <p><b>Internal Projects (UC3M Funding):</b></p> <ul style="list-style-type: none"> <li>• Strategic Action in Polymer Composites and Interfaces</li> </ul>	<p><b>Experience and capabilities:</b></p> <ul style="list-style-type: none"> <li>• Preparation of new nanocomposites</li> <li>• Material characterization: <ul style="list-style-type: none"> <li>· Structure (DRX, FTIR, Fluorescence).</li> <li>· Morphology (MO, SEM, AFM)</li> <li>· Thermal properties (DSC, TGA, Nano-heat deformation)</li> <li>· Mechanical properties (traction, bending, nanoindentation)</li> <li>· Electrical properties (Dielectric stiffness, conductivity, impedance spectroscopy)</li> </ul> </li> <li>• Materials with potential applications as pressure sensors</li> <li>• Materials for controlled drug release</li> <li>• Antibacterial thermoplastics</li> </ul> <p><b>Equipment:</b></p> <ul style="list-style-type: none"> <li>• Electron Microscopy Laboratory</li> <li>• Atomic Force Microscopy Laboratory</li> <li>• Polymer Characterization Laboratory</li> <li>• Material Preparation Laboratory</li> <li>• Materials Technology Laboratory</li> </ul>

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MATERIALS SCIENCE AND ENGINEERING AND CHEMICAL ENGINEERING			
<p><u>Polymer and interface in composite materials</u></p> <hr/> <p>Group head: Javier González Benito</p>		<p><b>Private Funding:</b></p> <ul style="list-style-type: none"> <li>• Morphological characterization of rubber particles from out-of-use tires</li> <li>• Surface preparation by means of cutting samples of fiberglass-reinforced epoxy resin-based composites with an ultracryomicrotome for the inspection and subsequent viewing by microscopy techniques</li> <li>• Prevention of diseases with Antimicrobial Materials in the food and health sectors (Crowdfunding)</li> <li>• Study and characterization of a thermoplastic material loaded with carbon nanofibers for rotational molding processes with applications for the aeronautics industry</li> </ul>	



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MATERIALS SCIENCE AND ENGINEERING AND CHEMICAL ENGINEERING			
<p><u>Numerical Modelling, Simulation and Industrial Mathematics Group</u></p> <p>Group head: Luis López Bonilla</p>	<ul style="list-style-type: none"> <li>• Dynamic of computational fluids and biomedical fluids. Multi-phase flows</li> <li>• Non-linear phenomena in microelectronic semiconductor devices</li> <li>• Formation of bacterial films (biofilms) on surfaces in contact with fluids (catheters, lines, pacemakers, prostheses, implants, tissues...) and the progression thereof (growth, expansion, reduction, breakdown...) depending on external conditions (nutrients, chemical agents, type of flow, structure of the devices)</li> <li>• Multiscale materials modelling</li> <li>• Magnetic and superconductor materials modelling</li> <li>• Modelling of dislocations, cracks and other defects in Computational Materials Science</li> <li>• Models of defects in solids and multiscale simulations</li> <li>• Properties of graphene</li> <li>• Nano-electro-mechanical systems (NEMS)</li> <li>• Charge and spin transport in nanostructures and electronic nanodevices</li> </ul>	<p><b>R&amp;D National Plan Projects:</b></p> <ul style="list-style-type: none"> <li>• Collective and stochastic behaviour and in nano- and biomaterials</li> <li>• Non-linear transport phenomena in nanostructures</li> <li>• Hybrid models for nano- and biosystems</li> <li>• OVIDI. Discrete-time travelling waves: domain walls, dislocations and cracks</li> <li>• Multiscale problems in materials: Defects and Growth</li> </ul> <p><b>R&amp;D Regional Plan Projects (C. Madrid):</b></p> <ul style="list-style-type: none"> <li>• Study of hydrodynamic aspects of combustion and charge transport problems</li> </ul>	<p><b>Experience and Capabilities:</b></p> <ul style="list-style-type: none"> <li>• Nanotechnology and Computational Materials Science: <ul style="list-style-type: none"> <li>· Modelling and numerical simulation of electron transport in semiconductor nanostructures subjected to intense fields</li> <li>· Magnetic and superconductor materials modelling</li> <li>· Modelling of dislocations, cracks and other defects in Computational Materials Science</li> </ul> </li> </ul> <p><b>Equipment:</b></p> <ul style="list-style-type: none"> <li>• The GMSMI has considerable hardware and software capabilities for approaching numerical simulation projects. Furthermore, it is able to conduct supercomputing projects through its collaboration with the CIEMAT, which allows it access the parallel processing SGI Origin 3800 computer, which has 160 MIPS R14000 processors with Gb of memory and 900 Gb of disk space.</li> </ul>

R&D GROUP	LINES OF RESEARCH	RESEARCH PROJECTS	TECHNOLOGICAL OFFER / OTHERS
MATERIALS SCIENCE AND ENGINEERING AND CHEMICAL ENGINEERING			
<b><u>Polymers and Composites</u></b>  <b>Group head:</b> <b>Juan Baselga</b>	<ul style="list-style-type: none"> <li>• Luminescence techniques in polymers, composites and nanocomposites</li> <li>• Heat-setting hybrid polymers and mixtures of polymers</li> <li>• Nanoreinforcements and nanocomposites</li> <li>• Atomistic simulation</li> <li>• Materials for electromagnetic shielding</li> </ul>	<p><b>European Projects:</b></p> <ul style="list-style-type: none"> <li>• Nano-CONductive-polymer composites with predefined architecture and customised dielectric and EMS properties (GHz frequency domain) dedicated to shielding and absorbent PANELs for special building (NACOPAN)</li> </ul> <p><b>R&amp;D National Plan Projects:</b></p> <ul style="list-style-type: none"> <li>• Dispersion of nanoparticles in heat-setting hybrid</li> <li>• Playing darts with nanoparticles</li> <li>• Nanocomposites with hierarchically structured architectures</li> <li>• Nanocomposites with functionalized particles</li> <li>• Advanced Functional Materials to be applied in Highways and Buildings (MAMCE)</li> <li>• Synthesis and applications of doped carbon nanotubes</li> <li>• Self healing and rEsistant Asphalts for PORTs</li> </ul> <p><b>R&amp;D Regional Plan Projects (C. Madrid):</b></p> <ul style="list-style-type: none"> <li>• Polymer-based nanostructured materials: interface phenomena in connection with their properties and advanced applications</li> </ul> <p><b>Internal Projects (UC3M Funding):</b></p> <ul style="list-style-type: none"> <li>• Strategic Action in Nanocomposites</li> </ul>	<p><b>Experience and Capabilities:</b></p> <ul style="list-style-type: none"> <li>• Polymer chemistry and physics</li> <li>• Nanocomposites</li> <li>• Polymer photochemistry and photophysics</li> <li>• Electromagnetic shielding</li> <li>• 2D and 1D materials</li> <li>• Modification of silicas with silanes</li> <li>• Polymer grafting in silicas and aluminas</li> <li>• Modification of graphene and carbon nanotubes with polymers</li> <li>• Synthesis and surface modification of magnetic nanoparticles</li> <li>• Modification of aluminas with fatty acids</li> <li>• Materials for nanoreinforced polysulfone braces</li> <li>• Process compatible with biosanitary protocols</li> </ul> <p><b>Patents:</b></p> <ul style="list-style-type: none"> <li>• Materials for electromagnetic shielding <ul style="list-style-type: none"> <li>· Patent ES2509390</li> </ul> </li> <li>• Nanoreinforced polymers <ul style="list-style-type: none"> <li>· Patent ES2431492 (jointly owned with Euroortodoncia)</li> </ul> </li> </ul>

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MATERIALS SCIENCE AND ENGINEERING AND CHEMICAL ENGINEERING			
<u>Polymers and Composites</u>  Group head: Juan Baselga		<b>Private Funding:</b> <ul style="list-style-type: none"> <li>• Aircraft Lightning Strike Protection with Graphene Hybrid Nanomaterials (LIGHTGRAPH)</li> <li>• Developmental research of Nano-reinforced Composites with Advanced Mechanical and Electrical Properties</li> <li>• Improvement in mechanical and electrical properties in carbon fiber composites</li> <li>• NANOBRAK: Development of biocompatible nano-reinforced polymer materials for biosanitary use</li> </ul>	<b>Equipment:</b> <ul style="list-style-type: none"> <li>• Simulation Laboratory</li> <li>• Synthesis and Characterization Laboratory</li> <li>• Water Treatment Laboratory</li> </ul>

R&D GROUP	LINES OF RESEARCH	RESEARCH PROJECTS	TECHNOLOGICAL OFFER / OTHERS
MATERIALS SCIENCE AND ENGINEERING AND CHEMICAL ENGINEERING			
<p><b><u>Material synthesis and processing</u></b></p> <p><b>Group head:</b> Alejandro Varez, Belén Levenfeld</p>	<ul style="list-style-type: none"> <li>• Ceramic or metallic powder injection molding (PIM, MIM, CIM)</li> <li>• Powder extrusion molding (PEM)</li> <li>• Energy storage systems: lithium, sodium and calcium batteries</li> <li>• Energy generating systems: polymer and solid oxide fuel cells</li> <li>• Flow batteries</li> <li>• Magnetic ceramics</li> <li>• Synthesis and structural characterization of ceramic and polymer materials</li> <li>• Rheological behaviour of polymer systems</li> </ul>	<p><b>European Projects:</b></p> <ul style="list-style-type: none"> <li>• HINMICO: High throughput integrated technologies for multimaterial functional Micro Components (MNG)</li> <li>• NANOLICOM: Nanostructured Lithium Conducting Materials</li> </ul> <p><b>R&amp;D National Plan Projects:</b></p> <ul style="list-style-type: none"> <li>• Efficient energy storing and producing electrodes and electrolytes: batteries and fuel cells</li> <li>• New materials for electrochemical devices: electrodes and electrolytes for rechargeable lithium batteries and fuel cells</li> <li>• Synthesis, characterization and processing of materials for batteries and fuel cells</li> </ul> <p><b>R&amp;D Regional Plan Projects (C. Madrid):</b></p> <ul style="list-style-type: none"> <li>• Materials for energy and related materials (MATERYENER-II)</li> <li>• Materials for energy: electrical, magnetic and superconductor materials (MATERYENER3-CM)</li> </ul> <p><b>Internal Funding Projects (UC3M):</b></p> <ul style="list-style-type: none"> <li>• Strategic Action for Research in Materials for batteries and fuel cells</li> <li>• Strategic Action for Research in Materials for energy</li> </ul>	<p><b>Experience and Capabilities:</b></p> <ul style="list-style-type: none"> <li>• Manufacture <ul style="list-style-type: none"> <li>· Uniaxial pressing</li> <li>· Cold isostatic pressing (CIP)</li> <li>· Dry mixing</li> <li>· Mixing with rotors with torque measurement</li> <li>· Twin screw extruder</li> <li>· Granulator</li> <li>· Injector</li> </ul> </li> <li>• Thermal Characterization <ul style="list-style-type: none"> <li>· Differential Scanning Calorimetry (DSC)</li> <li>· Thermogravimetric Analysis (TGA)</li> <li>· Dynamic Mechanical Analysis (DMA)</li> <li>· Dilatometry</li> </ul> </li> <li>• Heat Treatments <ul style="list-style-type: none"> <li>· Pyrolysis furnaces, furnaces up to 1800°C, controlled-atmosphere tubular furnaces, vacuum furnace, hydrogen furnace up to 1800°C</li> <li>· Muffle furnaces</li> </ul> </li> <li>• Analytics <ul style="list-style-type: none"> <li>· Laser particle analyzer</li> <li>· Ice pycnometer</li> <li>· Capillary extrusion rheometer</li> <li>· EDS microanalysis</li> </ul> </li> </ul>



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MATERIALS SCIENCE AND ENGINEERING AND CHEMICAL ENGINEERING			
<p><u>Material synthesis and processing</u></p> <p>Group head: Alejandro Varez, Belén Levenfeld</p>		<p><b>Private Funding:</b></p> <ul style="list-style-type: none"> <li>• Characterization of polymer membranes for use in flow batteries</li> <li>• High-density ferrites</li> <li>• Application of ceramic injection molding to the manufacture of parts used in orthodontics</li> <li>• Development of emitting/receiving antennas with new "ALMA" technology to be applied in secure access systems based on PKE technology</li> </ul>	<ul style="list-style-type: none"> <li>• Structural and Microstructural Characterization Techniques <ul style="list-style-type: none"> <li>· Optical microscopy</li> <li>· Scanning electron microscopy</li> <li>· X-ray diffraction</li> </ul> </li> <li>• Mechanical and Tribological Characterization Techniques</li> <li>• Electrochemical Characterization Techniques</li> <li>• Sample Preparation</li> </ul> <p><b>Patents:</b></p> <ul style="list-style-type: none"> <li>• Process of manufacturing metal parts from metal powders using heat-setting acrylic resins as a binder (ES2167130.)</li> <li>• Electrodes for rechargeable batteries (P201630313)</li> </ul>

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MATERIALS SCIENCE AND ENGINEERING AND CHEMICAL ENGINEERING			
<b>Powder Technology</b>  <b>Group head:</b> <b>José Manuel Torralba, Elena Gordo</b>	<b>Special production and characterization techniques:</b> <ul style="list-style-type: none"> <li>• Spray-pyrolysis for nanoparticle production. Atomization</li> <li>• Mechanical milling</li> <li>• Powder injection molding</li> <li>• Corrosion of powder metallurgy materials.</li> <li>• Sol-gel coatings</li> <li>• Diffusion surface treatments for protection against corrosion, wear and high temperature.</li> <li>• Thermodynamic and kinetic process optimization</li> </ul> <b>Materials:</b> <ul style="list-style-type: none"> <li>• Low-alloy sintered steels</li> <li>• Sintered stainless steels</li> <li>• Sintered tools steels and Fe-based composites</li> <li>• Sintered Ti alloys and Ti matrix composites</li> <li>• Sintered Cu-based alloys</li> <li>• Sintered Al alloys and Al matrix composites</li> <li>• Nickel-based alloys</li> </ul>	<b>European Projects:</b> <ul style="list-style-type: none"> <li>• Development of Materials for Metallic and Metal-Ceramic Filters</li> </ul> <b>R&amp;D National Plan Projects:</b> <ul style="list-style-type: none"> <li>• Ceramic-metal composites and refractory W alloys for application under severe service conditions: microstructural design and new processing routes</li> <li>• Development of self-repairing single-layer coatings with excellent anticorrosive features</li> <li>• Development of gamma TiAl advanced alloys for high performance components by powder metallurgy techniques (DATIAL)</li> <li>• Design of the Microstructure and Microarchitecture of Metal-ceramic Materials using Powder Metallurgy and Colloidal Technology</li> <li>• PeTitNeST: High Performance Titanium by Near Net Shape Technologies</li> <li>• Powder metallurgy processing of new ferrite ODS alloys (FeAl (CrZr) for severe use conditions</li> </ul> <b>R&amp;D Regional Plan Projects (C. Madrid):</b> <ul style="list-style-type: none"> <li>• Advanced structural materials (ESTRUMAT)</li> <li>• MULTIMAT-CHALLENGE-CM. Multifunctional Materials for the Challenges facing Society</li> </ul>	<b>Experience and Capabilities:</b> <ul style="list-style-type: none"> <li>• Particle synthesis and powder production</li> <li>• Surface coatings and treatment</li> <li>• Kinetic and thermodynamic simulation</li> <li>• Materials processing by Powder Injection Molding (PIM)</li> <li>• Design and development of materials by powder technologies: <ul style="list-style-type: none"> <li>· Lightweight alloys and porous materials</li> <li>· Materials for high temperatures</li> </ul> </li> <li>• Characterization of materials: <ul style="list-style-type: none"> <li>· Thermal characterization</li> </ul> </li> </ul> <b>Patents:</b> <ul style="list-style-type: none"> <li>• Low-cost titanium alloys and method for preparing same <ul style="list-style-type: none"> <li>· Patent ES2341162</li> </ul> </li> <li>• Electrodes for the electrochemical recognition of ionic or molecular species based on polysiloxane membranes and their method of preparation <ul style="list-style-type: none"> <li>· Patent ES2160052 (co-owned with CSIC)</li> </ul> </li> <li>• Method of obtaining metallic sponges <ul style="list-style-type: none"> <li>· Patent ES2342815 (co-owned with CSIC)</li> </ul> </li> </ul>

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MATERIALS SCIENCE AND ENGINEERING AND CHEMICAL ENGINEERING			
<p><u>Powder Technology</u></p> <p>Group head: José Manuel Torralba, Elena Gordo</p>		<p><b>Internal Projects (UC3M Funding):</b></p> <ul style="list-style-type: none"> <li>• Strategic Action in Investigation in sintered tools steels and FE-based composites, and in sintered Ti alloys and Ti matrix composites</li> <li>• NANOMET: From metal powders to nanostructured metals and nanometals</li> </ul> <p><b>Private Funding:</b></p> <ul style="list-style-type: none"> <li>• Höganäs Chair for R&amp;D in Powder Metallurgy</li> <li>• Randall German Chair in Powder Metallurgy</li> <li>• Study and development of surface coatings in composite panels with metallic particles (REMACO - REcubrimientos MATERIAL COmpuesto (Composite Coatings))</li> <li>• Cryogenic treatment for the sustainable integral machining of hardened metal parts</li> </ul>	<ul style="list-style-type: none"> <li>• Process for manufacturing metal and/or ceramic parts using a polysaccharide-based thermoplastic binder system <ul style="list-style-type: none"> <li>· Patent ES2356952</li> </ul> </li> <li>• Sol-gel coating with ceramic nanoparticles for protecting a substrate and method for obtaining same <ul style="list-style-type: none"> <li>· Patent ES2334542 (co-owned with CSIC)</li> </ul> </li> <li>• Multifunctional coatings applying sol-gel type technologies <ul style="list-style-type: none"> <li>· Patent application P200802175 (co-owned with CSIC)</li> </ul> </li> </ul> <p><b>Equipment:</b></p> <p>The laboratories of the group are perfectly equipped for complying with requests under strict quality criteria:</p> <ul style="list-style-type: none"> <li>• Powder Technology Laboratory</li> <li>• Structural and Microstructural Characterization Laboratory</li> <li>• Thermal Analysis Laboratory</li> <li>• Mechanical Characterization Laboratory</li> <li>• Surface Engineering Laboratory</li> <li>• Injection Molding Laboratory</li> <li>• Software for calculating thermochemical and kinetic balance, Thermocalc and DICTRA</li> </ul>

R&D GROUP	LINES OF RESEARCH	RESEARCH PROJECTS	TECHNOLOGICAL OFFER / OTHERS
PHYSICS			
<p><u>Remote Detection, Sensors, and Infrared Images Laboratory (LIR – Infrared LAB)</u></p> <p>Group head: Fernando López</p>	<p>Non- invasive analysis: non-destructive and contactless analysis by means of infrared technology (NDT-IR)</p> <p><b>Applications:</b></p> <ul style="list-style-type: none"> <li>• Design and development of specific IR thermography systems for characterization of the internal structure of materials</li> <li>• Preventive analysis of anomalies</li> <li>• Behavioral models based on experimental data</li> <li>• Simulation and design</li> </ul>	<p><b>Internal Projects (UC3M Funding):</b></p> <ul style="list-style-type: none"> <li>• CIROCCO: Construction and InfraRed evaluation Of Cyanate ester Composites</li> </ul> <p><b>Private Funding:</b></p> <ul style="list-style-type: none"> <li>• SENSIA CHAIR of advanced studies in Applied Optics and Infrared Sensors</li> <li>• Characterization of thermo-mechanical behaviour of composite materials in fire and empirical determination of their properties</li> <li>• Development and validation of predictive models of the behaviour of carbon fiber-reinforced composites in fire</li> <li>• Calculation-behaviour models for specimens subjected to fire s/NT-T-SGL-10002</li> <li>• Empirical securing of diffusiveness, heat capacity, conductivity and specific heat of flat specimens subjected to fire</li> <li>• Empirical securing of parameters to validate calculating methods that determine the behaviour of specimens subjected to fire</li> </ul>	<p><b>Experience and Capabilities:</b></p> <ul style="list-style-type: none"> <li>• <b>Non-destructive Analysis:</b> <ul style="list-style-type: none"> <li>· Development of novel solutions to problems arising in the industry. Vast experience in CFRP, particularly those of interest for the aeronautics industry</li> <li>· Development of IR thermography techniques to empirically determine the thermal parameters of the material (diffusiveness, conductivity, specific heat, etc.)</li> <li>· Prediction of the behaviour of the material in any medium and in response to any stimulus as a result of the knowledge about the thermodynamic properties of the material, and the application thereof to conventional heat transfer models</li> <li>· A new method of determining thermal parameters derived from the conventional method for being implemented in CFRP was achieved</li> </ul> </li> <li>• <b>Simulation and design:</b> Software tools to simulate the thermal behaviour of a material subjected to high temperatures <ul style="list-style-type: none"> <li>· The LIR-InfraRedLAB of UC3M has determined the thermal parameters of carbon fiber composites as well as their dependence on temperature. By entering the type of material, its geometry, temperature and time of exposure, a simulation of its behaviour is obtained</li> </ul> </li> </ul>





R&D GROUP	LINES OF RESEARCH	RESEARCH PROJECTS	TECHNOLOGICAL OFFER / OTHERS
PHYSICS			
<u>Remote Detection, Sensors, and Infrared Images Laboratory (LIR – Infrared LAB)</u>  Group head: Fernando López			<ul style="list-style-type: none"> <li>The 3DFireSimulator (3DFS) is software for the virtual analysis of the thermal behaviour of materials subjected to fire. By means of three-dimensional calculation, the progression of the temperature at any point of the sample and at any time during the analysis is shown</li> </ul> <p><b>Laboratories:</b></p> <ul style="list-style-type: none"> <li>Infrared Imaging and remote detection sensors laboratory (LIR-InfraRed LAB)</li> <li>IR Spectral Sensors Laboratory (LABSENS)</li> <li>Infrared Imaging and Thermography Laboratory (LATIR), attached to the Laboratory Network of the Autonomous Community of Madrid</li> </ul> <p><b>Equipment:</b></p> <ul style="list-style-type: none"> <li>IR cameras: MIR, LWIR and VIS/NIR</li> <li>Spectrophotometer and FTIR Spectroradiometry</li> <li>High-resolution hyperspectral imaging system</li> <li>Calibration black bodies</li> <li>IR detectors and electronic instruments for manufacturing prototypes</li> </ul>

R&D GROUP	LINES OF RESEARCH	RESEARCH PROJECTS	TECHNOLOGICAL OFFER / OTHERS
PHYSICS			
<p><b><u>Nanostructured and multifunctional materials</u></b></p> <p><b>Group head:</b> Miguel Ángel Monge</p>	<ul style="list-style-type: none"> <li>• Research Lines</li> <li>• Biomaterials and biological materials</li> <li>• Development of new materials</li> <li>• Ceramic materials</li> <li>• Nanostructured materials</li> </ul>	<p><b>R&amp;D National Plan Projects:</b></p> <ul style="list-style-type: none"> <li>• Nanoscale characterization of oxide dispersion-hardened low-activation steels</li> <li>• Development of new ODS tungsten and steel alloys for fusion reactors</li> <li>• Production and evaluation of tungsten, copper and steel, ultrafine grained and oxide dispersion-reinforced alloys for fusion applications</li> </ul> <p><b>R&amp;D Regional Plan Projects (C. Madrid):</b></p> <ul style="list-style-type: none"> <li>• Physical and biological characterization of materials made up of hydroxyapatite reinforced with Y2O3 nanoparticles produced by slip casting</li> <li>• MULTIMAT-CHALLENGE-CM. Multifunctional Materials for the Challenges facing Society</li> </ul> <p><b>Internal Projects (UC3M Funding):</b></p> <ul style="list-style-type: none"> <li>• Strategic Action in the Processing and Characterization of Nanostructured and Multifunctional Materials</li> </ul> <p><b>Projects funded by CIEMAT:</b></p> <ul style="list-style-type: none"> <li>• Development of ODS Fe-Cr alloys for fusion applications</li> <li>• Production and characterization of laboratory-scale batches of nano-structured ODSFS (Fe-14Cr-2W-0.3Ti-0.3Y2O3&amp;#8221)</li> <li>• Ion Irradiation and post-irradiation characterization of produced nano-structured ODSFS</li> </ul> <p><b>Other projects:</b></p> <ul style="list-style-type: none"> <li>• Study of quick particle-reinforced steel injection molding process</li> </ul>	<p><b>Experience and Capabilities:</b></p> <ul style="list-style-type: none"> <li>• Materials for fusion. Processing and characterization of: <ul style="list-style-type: none"> <li>· W alloys</li> <li>· Cu alloys</li> <li>· Steels</li> </ul> </li> <li>• Lightweight materials. Processing and characterization of Al and Ti</li> </ul>

R&D GROUP	LINES OF RESEARCH	RESEARCH PROJECTS	TECHNOLOGICAL OFFER / OTHERS
PHYSICS			
<u>Semiconductor Nanostructures Group</u>  <b>Group head:</b> Rosa María de la Cruz Fernández	<ul style="list-style-type: none"> <li>• Theory, modelling and simulation in: <ul style="list-style-type: none"> <li>· Optical properties in semiconductor nanostructures (quantum dots, nanoshells, etc.)</li> <li>· Growth mechanisms (coherent and incoherent) in semiconductor quantum dots.</li> <li>· Polarons in semiconductor nanostructures</li> </ul> </li> </ul>	<b>Internal Projects (UC3M Funding):</b> <ul style="list-style-type: none"> <li>• Trends in Nanotechnology</li> </ul>	

R&D GROUP	LINES OF RESEARCH	RESEARCH PROJECTS	TECHNOLOGICAL OFFER / OTHERS
PHYSICS			
<b><u>Ceramic oxides</u></b>  <b>Group head:</b> <b>Juan Enrique Muñoz Santiuste</b>	<ul style="list-style-type: none"> <li>• Solid-state physics</li> <li>• Electron microscopy</li> <li>• Defects in solids</li> <li>• Optical, mechanical and electrical properties of solids</li> <li>• Surface reactivity</li> <li>• Diffusion in solids</li> <li>• Laser materials</li> <li>• Radiation-induced damage</li> <li>• Materials for thermonuclear fusion</li> </ul>	<b>R&amp;D National Plan Projects:</b> <ul style="list-style-type: none"> <li>• Characterization of the wear and emission of secondary electrons induced by bombarding noble gases on thin MgO films for application in plasma displays</li> <li>• Study of the problems of optics, mechanics and transport of single crystals and thin ceramic oxide films. Surface characterization</li> <li>• Surface modification of transport, optical and mechanical properties of ceramic oxides by ion implantation</li> </ul> <b>R&amp;D Regional Plan Projects (C. Madrid):</b> <ul style="list-style-type: none"> <li>• Surface characterization of thin MGXOY films grown by cathode sputtering</li> <li>• Growth of thin ceramic oxides films by cathode sputtering</li> <li>• Advanced structural materials</li> <li>• MULTIMAT-CHALLENGE: multifunctional materials for the challenges facing society</li> </ul> <b>Private Funding:</b> <ul style="list-style-type: none"> <li>• Simulation of Fluids and Structures (Project SIFES)</li> </ul>	



R&D GROUP	LINES OF RESEARCH	RESEARCH PROJECTS	TECHNOLOGICAL OFFER / OTHERS
MECHANICAL ENGINEERING			
<p><b><u>Mechanical and Biomechanical Component Manufacturing and Design Technology</u></b></p> <p>Group head: M<sup>a</sup> Henar Miguélez</p>	<ul style="list-style-type: none"> <li>• Machining <ul style="list-style-type: none"> <li>· Numerical modelling of machining processes</li> <li>· Process definition and optimization</li> <li>· Machinability tests</li> <li>· Machining prototypes</li> <li>· Study on machining special materials</li> <li>· Ecological machining</li> </ul> </li> </ul>	<p><b>R&amp;D National Plan Projects:</b></p> <ul style="list-style-type: none"> <li>• Advanced design and manufacturing of integral personal protections for military use and for State Law Enforcement Bodies and Agents (PROTEC_DAF)</li> <li>• Modelling the carbon fiber composite drilling process</li> <li>• Optimization of turbojet critical component finishing processes</li> </ul> <p><b>R&amp;D Regional Plan Projects (C. Madrid):</b></p> <ul style="list-style-type: none"> <li>• Dry drilling the Ti6Al4V alloy: Analysis of the thermal damage and wear of tools by means of experimental and numerical simulation techniques</li> </ul> <p><b>Internal Projects (UC3M Funding):</b></p> <ul style="list-style-type: none"> <li>• COMPTMACH: Improving competitiveness in advanced material machining</li> <li>• DATES: Interaction and damage of the system of n deformable bodies of different nature</li> <li>• HSREMNI: Analysis of high speed removal processes of Ni alloys</li> </ul> <p><b>Private Funding:</b></p> <ul style="list-style-type: none"> <li>• Drilling Processes Improvement for Multi Material CFRP-AL-TI Stacks</li> <li>• Cryogenic treatment for the sustainable integral machining of hardened metal parts</li> </ul>	<p><b>Technological Offer:</b></p> <ul style="list-style-type: none"> <li>• Experimental techniques for the study of the behaviour of mechanical systems</li> <li>• Techniques of detection of defects in mechanical systems</li> <li>• Technologies of manufacturing components for the aeronautics industry</li> </ul> <p><b>Equipment:</b></p> <p>Work stations and PCs with finite element numerical simulation software (ABAQUS)</p> <ul style="list-style-type: none"> <li>• Machining center</li> <li>• Numerical control lathe</li> <li>• Extensometry equipment</li> <li>• Data acquisition systems with different sampling ranges</li> <li>• Surface analysis equipment</li> <li>• Systems for measuring forces, displacements and deformations</li> <li>• Testing device for rotating mechanical elements</li> </ul>

R&D GROUP	LINES OF RESEARCH	RESEARCH PROJECTS	TECHNOLOGICAL OFFER / OTHERS
CONTINUUM MECHANICS AND STRUCTURAL ANALYSIS			
<p><b><u>Lightweight Structures Dynamics</u></b></p> <p><b>Group head:</b> David Varas Doval, Jorge López Puente</p>	<ul style="list-style-type: none"> <li>• Behaviour of metal structures in response to the impact of different types of objects (rigid fragments, ice, ballistic gel, etc.)</li> <li>• Behaviour of structures made from composites in response to the impact of different types of objects (rigid fragments, ice, ballistic gel, etc.)</li> <li>• Development of behavioral models for materials at high deformation rates</li> <li>• Analysis of the behaviour of ice under impact conditions</li> <li>• Behaviour of fuel tanks subjected to impact (HRAM)</li> <li>• Analysis of impacts of composite fragments</li> <li>• Identification and numerical and experimental characterization of compressible anisotropic plasticity models in both quasi-static and dynamic regimens</li> <li>• Elastic regime homogenization for the materials with anisotropic elasticity and microstructure</li> </ul>	<p><b>European Projects:</b></p> <ul style="list-style-type: none"> <li>• CROR Engine debris Middle Level Impact Mechanical Test</li> </ul> <p><b>R&amp;D National Plan Projects:</b></p> <ul style="list-style-type: none"> <li>• Analysis of the behaviour of carbon/epoxy laminates subjected to impacts of carbon/epoxy laminate fragments</li> <li>• Analysis of behaviour of carbon/epoxy laminates subjected to impacts of ice fragments</li> </ul> <p><b>R&amp;D Regional Plan Projects:</b></p> <ul style="list-style-type: none"> <li>• Development of a multi-scale model for behaviour in response to the impact of carbon/epoxy laminates with tissue architecture</li> </ul> <p><b>Internal Projects (UC3M Funding):</b></p> <ul style="list-style-type: none"> <li>• Strategic Action in the study of the behaviour of structural materials subjected to dynamic loads</li> <li>• Strategic Action in the behaviour of aeronautical structures made from a composite subjected to high deformation rates</li> </ul>	<p><b>Experience:</b></p> <p>Various experimental methodologies have been developed in the group in order to carry out complex high- and medium-velocity impact tests. The group also has vast experience in elaborating behaviour models for materials under high deformation rates, and in developing simple analytical models for modelling the impact phenomena.</p> <p><b>Capabilities:</b></p> <ul style="list-style-type: none"> <li>• High-speed pneumatic launchers that allow driving both rigid objects, such as ice fragments, or ballistic gel for dummy bird testing</li> <li>• Complete mechanical characterization of structural elements at different deformation rates</li> <li>• Filming the tests by means of high-speed photographic cameras</li> <li>• Digital 3D image correlation</li> <li>• Inspection by ultrasounds (C-SCAN)</li> </ul> <p><b>Equipment:</b></p> <ul style="list-style-type: none"> <li>• Numerical Simulation Laboratory</li> </ul>

R&D GROUP	LINES OF RESEARCH	RESEARCH PROJECTS	TECHNOLOGICAL OFFER / OTHERS
CONTINUUM MECHANICS AND STRUCTURAL ANALYSIS			
<p><u>Lightweight Structures Dynamics</u></p> <p>Group head: David Varas Doval, Jorge López Puente</p>		<p><b>Private Funding:</b></p> <ul style="list-style-type: none"> <li>• Additional Studies of Impact configurations and method validation</li> <li>• Testing the impact of gel on static plates</li> <li>• Low level ballistic impacts on metallic and composite plates for method validation</li> <li>• Advanced Composites Innovation and Rear-End Optimization (ICARO)</li> <li>• Simulation capabilities for Impact predictive models and blade impact damage characterization</li> <li>• Research work on the impact of ice on composites</li> </ul>	

R&D GROUP	LINES OF RESEARCH	RESEARCH PROJECTS	TECHNOLOGICAL OFFER / OTHERS
CONTINUUM MECHANICS AND STRUCTURAL ANALYSIS			
<p><b><u>Dynamics and Fracture of Structural Elements</u></b></p> <p><b>Group head:</b> Ramón Zaera, José Fernández Sáez</p>	<ul style="list-style-type: none"> <li>• Dynamic behaviour of structural elements: simulation and experimental analysis <ul style="list-style-type: none"> <li>· Impact problems on structural elements for aeronautical use</li> <li>· Dynamic instabilities</li> <li>· Personal protections</li> <li>· Vibrations of structural elements</li> <li>· Structures for absorbing energy</li> </ul> </li> <li>• Characterization of materials and development of constitutive models <ul style="list-style-type: none"> <li>· Fracture and damage mechanics</li> <li>· Fracture testing in dynamic conditions</li> </ul> </li> <li>• Generalized continuum mechanics <ul style="list-style-type: none"> <li>· Non-local and gradient theories</li> <li>· Lattice structures</li> </ul> </li> <li>• Mechanical behaviour of biomedical and biological materials <ul style="list-style-type: none"> <li>· Simulation and testing of structural prostheses</li> <li>· Bio-inspired structures</li> </ul> </li> </ul>	<p><b>European Projects:</b></p> <ul style="list-style-type: none"> <li>• The outstanding challenge in solid mechanics: engineering structures subjected to extreme loading conditions (OUTCOME). Marie Skłodowska-Curie Innovative Training Network (ITN), Pilar Ciencia Excelente H2020</li> <li>• Characterization of Structural Behaviour for High Frequency Phenomena (CRASHING). Clean Sky. FP7</li> </ul> <p><b>R&amp;D National Plan Projects:</b></p> <ul style="list-style-type: none"> <li>• Behaviour models and failure criteria applicable to the PMMA subjected to impulse loads</li> <li>• Influence of the deformation rate on the failure conditions of metal structures for absorbing energy.</li> <li>• Non-local continuous models for analysis of the behaviour of structured solids</li> <li>• A pending challenge of solid mechanics: engineering structures subjected to extreme load conditions. Action for promotion, European research</li> <li>• Intelligent and Environmentally Sustainable Technologies for Generating Composite Structures (TARGET)</li> <li>• Development of advanced numerical simulation algorithms for new structures (SUPERCALCULUS:)</li> </ul>	<p><b>Experience and Capabilities:</b></p> <p>Vast experience in the analysis of mechanical behaviour against impacts and fractures of mechanical and structural elements, using both experimental and modelling methodologies. Relevant problems for the industrial sector are dealt with, taking into consideration their impact, novelty and scientific and technological interest. Experience in training doctors in collaboration with research centers and with the industrial sector.</p> <p><b>Equipment:</b></p> <ul style="list-style-type: none"> <li>• Aeronautical Structure Impact Laboratory The purpose of this laboratory is to provide service to the industry in those fields requiring knowledge about the mechanical properties of any type of material at different deformation rates and temperatures, particularly in dynamic conditions. The group has a wide range of equipment and highly qualified staff members</li> <li>• Numerical Simulation Laboratory This laboratory deals with a wide range of problems of industrial interest (dynamic, impact, fracture and fatigue, among others), by means of commercial codes and internally developed codes</li> </ul> <p>These laboratories are shared with other groups in the same Department.</p>

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R&D GROUP	LINES OF RESEARCH	RESEARCH PROJECTS	TECHNOLOGICAL OFFER / OTHERS
CONTINUUM MECHANICS AND STRUCTURAL ANALYSIS			
<u>Dynamics and Fracture of Structural Elements</u>  Group head: Ramón Zaera, José Fernández Sáez		<b>Private Funding:</b> <ul style="list-style-type: none"> <li>• Mechanical characterization of the Airbus A350 XWB Horizontal Stabilizer</li> <li>• Development of numerical support tools for biomedical research in human prostheses and tissues</li> <li>• Monitoring single and multiple impact of aeronautical thermoplastic protections</li> </ul>	

R&D GROUP	LINES OF RESEARCH	RESEARCH PROJECTS	TECHNOLOGICAL OFFER / OTHERS
CONTINUUM MECHANICS AND STRUCTURAL ANALYSIS			
<p><b>Advanced Materials Mechanics</b></p> <p>Group head: Enrique Barbero</p>	<ul style="list-style-type: none"> <li>• Analysis and modelling of laminated- and sandwich-type structures subjected to high and low speed impulse loads</li> <li>• Analysis and modelling of composite structures for absorbing energy</li> <li>• Damage tolerance study of composite structural elements subjected to different load conditions</li> <li>• Innovation and development of non-conventional test methodologies for structural elements subjected to impact loads, with a particular emphasis on damage tolerance evaluation</li> <li>• Experimental modelling and analysis of the mechanical behaviour of composites in dynamic conditions</li> </ul>	<p><b>R&amp;D National Plan Projects:</b></p> <ul style="list-style-type: none"> <li>• Analysis of the behaviour of carbon/epoxy laminates subjected to impacts of carbon/epoxy laminate fragments</li> <li>• Numerical formulation and implementation of failure criteria in metallic structural elements for absorbing energy</li> <li>• Influence of the deformation rate on the failure conditions of metal structures for absorbing energy</li> <li>• Behaviour models and failure criteria applicable to the PMMA subjected to impulse loads</li> </ul> <p><b>R&amp;D Regional Plan Projects:</b></p> <ul style="list-style-type: none"> <li>• Use of meshless numerical methods in impact problems in lightweight structures for absorbing energy</li> </ul> <p><b>Internal Projects (UC3M Funding):</b></p> <ul style="list-style-type: none"> <li>• Strategic Action in Composite Structures for aeronautical and aerospace applications</li> <li>• Strategic Action in Behaviour of aeronautical structures made from a composite subjected to high deformation rates</li> </ul>	<p><b>Experience and Capabilities:</b></p> <p>Analysis and modelling of structural elements made with composites and sandwich elements subjected to impulse-type loads, as well as the damage tolerance study of these structural elements. The group has vast experience in the development of singular test methodologies.</p> <p><b>Equipment:</b></p> <ul style="list-style-type: none"> <li>• Calculation Laboratory</li> <li>• Experimental Laboratory</li> </ul>

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R&D GROUP	LINES OF RESEARCH	RESEARCH PROJECTS	TECHNOLOGICAL OFFER / OTHERS
CONTINUUM MECHANICS AND STRUCTURAL ANALYSIS			
<u>Advanced Materials Mechanics</u> Group head: Enrique Barbero		<b>Private Funding:</b> <ul style="list-style-type: none"> <li>• Additional studies of impact configurations and method validation</li> <li>• Dynamic tensile analysis on aeronautical materials.</li> <li>• Impact testing of ice against aluminum plates</li> <li>• Study of behaviour against low velocity impacts of sandwich structures.</li> <li>• Low level ballistic impacts on metallic and composite plates for method validation</li> </ul>	

R&D GROUP	LINES OF RESEARCH	RESEARCH PROJECTS	TECHNOLOGICAL OFFER / OTHERS
MATHEMATICS			
<p><u>Complex Systems Interdisciplinary Group (GISCI)</u></p> <p>Group head: Rodolfo Cuerno</p>	<ul style="list-style-type: none"> <li>• Statistical mechanics and non-linear dynamics</li> <li>• Materials and nanostructure science</li> <li>• Microfluidics and fluid absorption in structured substrates</li> <li>• Systems biology and synthetic biology</li> </ul>	<p><b>R&amp;D National Plan Projects:</b></p> <ul style="list-style-type: none"> <li>• Self-organization and fluctuations against growth, erosion and delaminating: theory and simulation</li> <li>• Interface dynamics in solids, fluids and biosystems</li> <li>• Theoretical approaches of (sub)micrometric interface dynamics and fluctuations</li> <li>• Structure and dynamics of complex fluids and their interfaces</li> <li>• Complex fluids and their interfaces</li> <li>• Modelling and simulation of interface dynamics in hard and soft material systems</li> <li>• "Hydrodynamic" models for the evolution of out-of-balance surfaces</li> <li>• Nanoscale pattern formation at surfaces</li> </ul> <p><b>R&amp;D Regional Plan Projects (C. Madrid):</b></p> <ul style="list-style-type: none"> <li>• Collective phenomena and complexity in surfaces at the submicro and nanometric scales</li> <li>• Modelling and simulation of complex systems (MOSAICO)</li> <li>• Nanotechnology of complex fluids</li> </ul> <p><b>Internal Projects (UC3M Funding):</b></p> <ul style="list-style-type: none"> <li>• Frontiers in interface physics: microfluidics, biomembranes and nanostructures</li> </ul>	<p><b>Technological Offer:</b></p> <ul style="list-style-type: none"> <li>• Computational models to simulate the growth of materials by surfaces techniques. It can be used to predict the morphology of the films produced depending on process parameters, with impact on Nanoscience and Nanotechnology systems</li> <li>• Modelling of wetting processes on nanometric scales and of the surface absorption of liquids in structured substrates. They are relevant for the design of lubrication and fluid handling systems from small distances, with important industrial and health applications</li> <li>• Mathematical models developed for the study of liquid crystals and granular media. Said models allow predicting observable patterns and textures both in liquid crystals (which form digital displays, for example) and granular media (such as mixtures of aggregates or grains of rice, for example)</li> </ul>

R&D GROUP	LINES OF RESEARCH	RESEARCH PROJECTS	TECHNOLOGICAL OFFER / OTHERS
TECHNOLOGY ELECTRONIC			
<p><b><u>Displays and Photonic Applications Group</u></b></p> <p><b>Group head:</b> José Manuel Sánchez Pena, Carmen Vázquez</p>	<ul style="list-style-type: none"> <li>• Electro-optical Devices and Applications: Optical and electrical characterization of devices (liquid crystals, electrochromic materials, etc.)</li> <li>• Photonic Devices for Optical Networks: Design and characterization of integrated optical devices</li> </ul>	<p><b>R&amp;D National Plan Projects:</b></p> <ul style="list-style-type: none"> <li>• Development of displays based on antiferroelectric liquid crystals and electroluminescent organic diodes for specialized portable systems with high added value</li> <li>• Advanced Liquid crystal and Electroluminescent Organic Diode Devices. Hybrid applications for 3D Vision</li> <li>• A new generation of photonic devices based on self-organized materials: characterization</li> </ul> <p><b>R&amp;D Regional Plan Projects (C. Madrid):</b></p> <ul style="list-style-type: none"> <li>• New photonic and electronic applications of liquid crystal devices (CLAFE)</li> </ul> <p><b>Internal Projects (UC3M Funding):</b></p> <ul style="list-style-type: none"> <li>• Strategic Action in Development of Electro-optical Systems for Biomedical, Assistance and Industrial Applications</li> </ul>	<p><b>Technological Offer:</b></p> <ul style="list-style-type: none"> <li>• Characterization of liquid crystal displays from the electrical and optical viewpoints simultaneously</li> <li>• Development of intelligent light control systems for buildings with home automation based on liquid crystal and electrochromic materials</li> </ul> <p><b>Patents:</b></p> <ul style="list-style-type: none"> <li>• Liquid crystal microlens and liquid crystal microlens matrix <ul style="list-style-type: none"> <li>· Spanish patent application P201630757</li> </ul> </li> </ul>