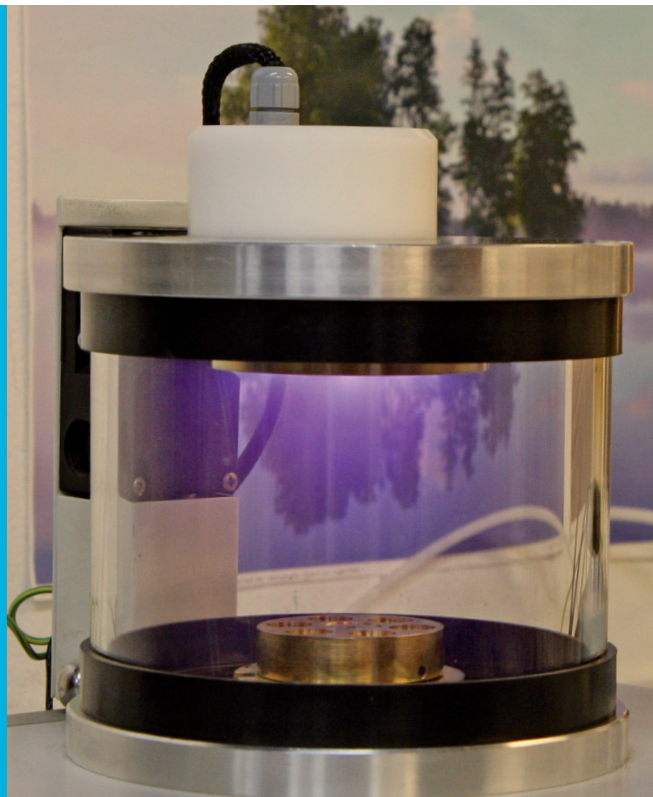


# SIPMAT

MATERIAL SYNTHESIS  
AND PROCESSING  
GROUP

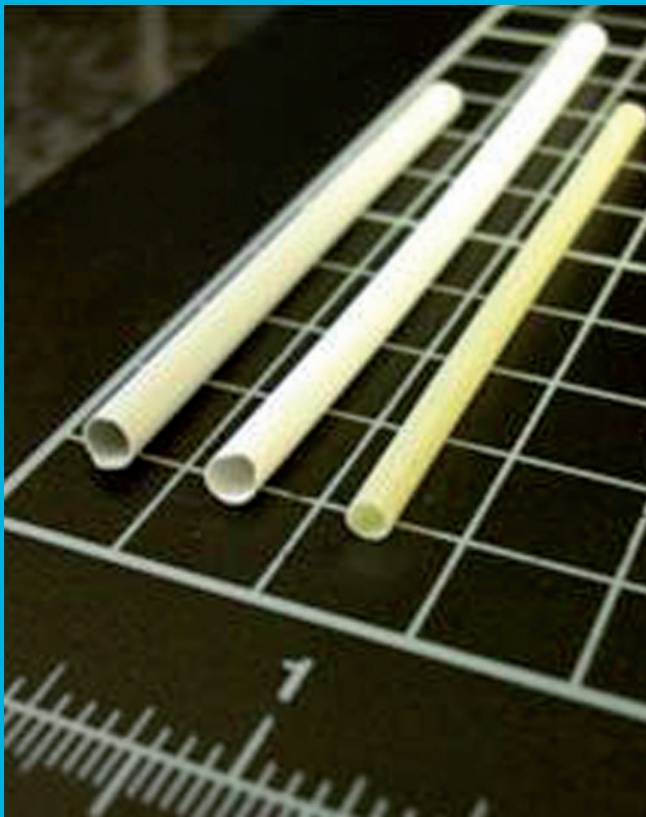
UC3M

R E S E A R C H G R O U P S



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*YSZ microtubes for SOFCs produced by Powder Extrusion Moulding.*

The Material Synthesis and Processing Group (SIPMAT), led by Professor Alejandro Várez and Professor Belen Levenfeld is a multidisciplinary research team with extensive experience in the synthesis, processing and characterization of ceramic, metal and polymeric materials.

SIPMAT aims to provide scientific and technological support to those companies that are facing new technological challenges, especially small and mid-sized enterprises. SIPMAT can therefore be the R&D department that many companies do not have by offering human and technological resources necessary to overcome said challenges.

SIPMAT also offers timely solutions to problems by performing assays or tests that the company requires.

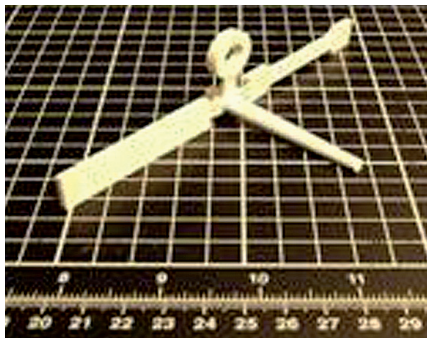
### • LINES OF RESEARCH •

- Injection molding of ceramics or metal powders (PIM, MIM, CIM).
- Powder extrusion molding (PEM).
- Polymer mixtures.
- Rheological behaviour of polymeric systems.
- Synthesis and structural characterization of ceramic materials.
- Power storage systems: lithium battery and phase change materials.
- Power generation systems: fuel cells.
- Magnetic ceramics.

### • OUTSTANDING COLLABORATIONS AND R&D&I PROJECTS •

The group collaborates with the following companies: MIMCRISA, EuroOrtodoncia-Grupo CEOSA, Ferroxcube y Sistemas Especiales de Inyección S.L. HIDROGENA Desarrollos Energéticos S.L., Prodintec, Lekue...

The following projects stand out among recent publicly funded R&D projects:



*Green Samples with three geometries after injection moulding.*

- Materials for Power and Related Materials. (MATERYENER-II).

*Funding Entity: Autonomous Community of Madrid (Comunidad de Madrid)*

*Date: 2009-2013*

- Synthesis, Characterization and Materials Processing for batteries and fuel cells.

*Funding Entity: Ministry of Science and Education (Ref. MAT2010-19837-C06-05)*

*Date: 2011-2013*

- “NANOLICOM-Nanostructured Lithium Conducting Materials”.

*Funding Entity: European Union 7<sup>th</sup> Framework Programme, PEOPLE Programme (IRSES action)*

*Date: 2010-2014*

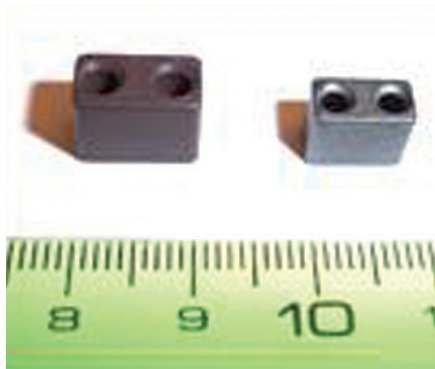
- HINMICO-High throughput integrated technologies for multimaterial functional Micro Components.

*Funding Entity: European Union 7<sup>th</sup> Framework Programme (Ref. FP7-2013-NMP-ICT-FOF)*

*Date: 2013-2015*

### • INNOVATIVE TECHNOLOGICAL SOLUTIONS •

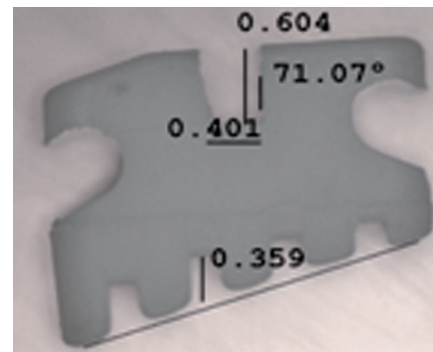
- Developing and optimizing metal or ceramic profile production process by means of Powder Extrusion Molding (PEM).
- Developing binding systems to obtain metal and ceramic parts by means of powder injection molding (PIM) technology.



*Green and sintered samples of ferrites.*

### • SCIENTIFIC-TECHNICAL SERVICES •

- Manufacturing.
- Thermal Characterization.
- Heat Treatments.
- Tests.
- Structural and Microstructural Characterization Techniques.
- Mechanical and Tribological Characterization Techniques.
- Sample preparation.
- Report preparation.



*Micrographs of alumina brackets produced by PIM.*

### • TECHNOLOGICAL EQUIPMENT •

- Laser particle analyzer.
- Carbon, sulfur, nitrogen and oxygen elemental analyzer.
- Precision scale.
- Differential Scanning Calorimeter (DSC).
- Uniaxial roller.

- Cutters.
- Trimmers and polishers.
- DMA (Dynamic Mechanical Analysis).
- Durometers and microdurometers.
- X-ray diffraction.
- Dilatometers.
- Fillers.
- Gold and graphite coating equipment.
- Twin screw extruder.
- Pelleting machine.
- Ovens (vacuum, hydrogen, different temperatures).
- Modular flow index.
- Injector: various molds for manufacturing tensile, bend and toroidal test specimens.
- Traction machines.
- Rotor mixers with torque measurement.
- EDS microanalysis.
- Scanning electron microscopy.
- Optical microscopy.
- Mills: centrifugal, planetary, vibratory and attrition.
- Charpy pendulum.
- Helium pycnometer to measure the density of powders and parts.
- Capillary extrusion rheometer.
- Thermoscale.



*Some pictures of instrumentation of our laboratory.*

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# SIPMAT

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Image: UC3M photographic files



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IMAGE OF COVER: *UC3M photographic files*