

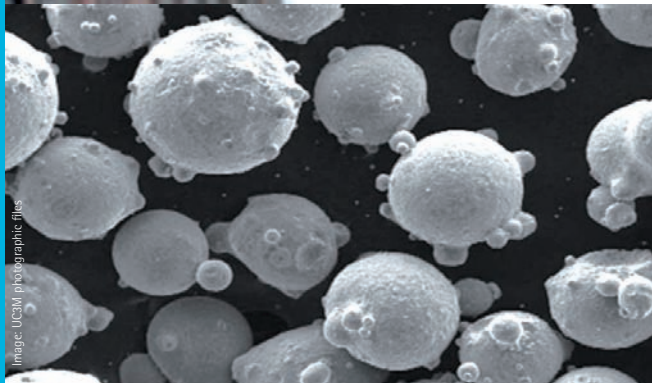
# GTP

POWDER  
TECHNOLOGY  
GROUP

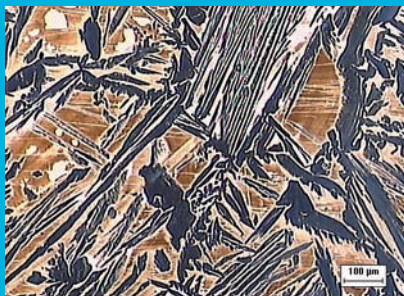
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R E S E A R C H G R O U P S

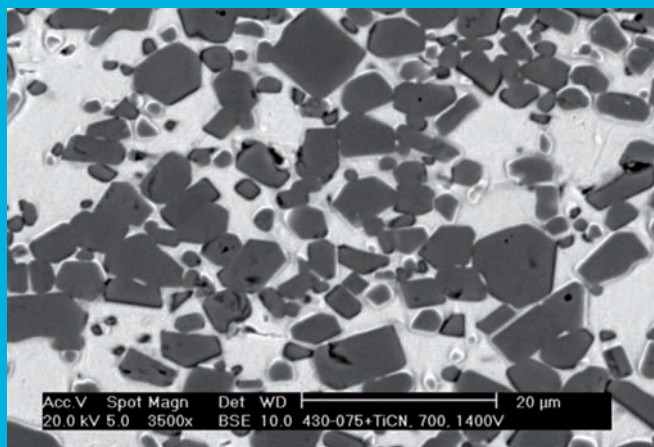
Image: UC3M photographic files



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*Duplex steel*



*Fe-Cr MATRIX cermet*

The Powder Technology Group (GTP), led by Dr. José Manuel Torralba Castelló and Dr. Elena Gordo Odériz, is formed by a multidisciplinary team of 22 researchers who are experts in developing solutions in the area of Powder/ Powder Metallurgy Technology.

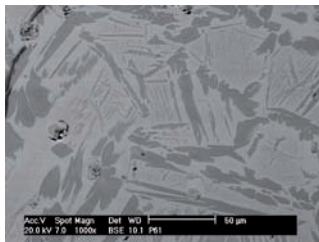
GTP has proven experience offering integral customized R&D, consulting, technical assistance and training services to optimize material manufacturing processes through powder/powder metallurgy technology, to study material service performance (wear and corrosion) and to characterize and design new materials with better features and a higher added value.

## • RESEARCH AREAS AND SCIENTIFIC-TECHNOLOGICAL SERVICES •

- Analysis and optimization of PROCESSES FOR SINTERING steels; Al, Ti, Cu and inter-metallic.
- Design and development of new high added-value materials using ATOMIZATION techniques in gas and in water, MECHANOSYNTHESIS (mechanical alloy high-energy grinding) and “SPRAY PYROLYSIS”.
- Design and optimization of POWDER INJECTION MOLDING (MIM) processes.
- Study of the effects produced by THERMAL AND THERMOCHEMICAL TREATMENTS in metallic materials.
- Evaluation and improvement of CORROSION and OXIDATION resistance of materials with and without coatings, diagnosis of the reasons for the failure and the development of new corrosion- and oxidation-resistant, high added-value materials as well as sol-gel coatings and other SURFACE TREATMENTS.
- WEAR resistance study of materials and coatings, diagnosis of the reasons for the failure and design of wear-resistant materials.
- Evaluation of the reasons for the service failure of components subjected to STATIC OR DYNAMIC MECHANICAL STRESSES and proposition of the reasons and possible improvements in the design of the material:
  - Metallographic studies on the heat treatment of the component.
  - Fractographic studies to determine the type of fracture and its origin.
  - Chemical analyses to determine the expected composition in the material of the component.
  - Complete diagnosis as to the reasons for the mechanical failure.
- Design and optimization of MATERIAL RECYCLING processes by means of grinding and subsequent use of powder metallurgical technologies.
- Design and optimization of materials, processes, by means of THERMODYNAMIC and KINETIC analyses.

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

The main clients and partners of the group include both national and international companies such as: Cofrisa, Tecresa, MIBA Sintermetal, Stadler, Valeo embragues, CESA, Metasint/Fersint, Tratamientos Térmicos Carreras, Höganäs, AMES, CASA, IberEspacio, ENDESA, MIM TECH ALFA, MOPASA, ITP.



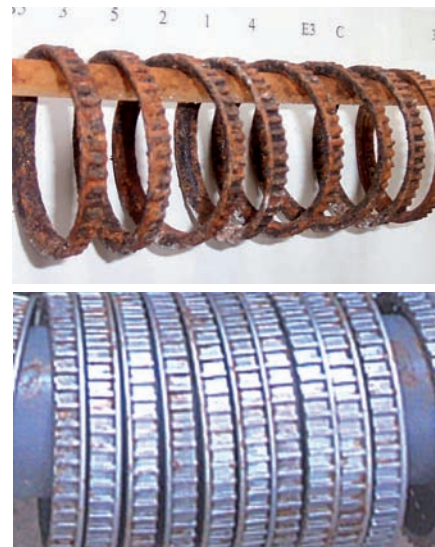
*Ti PM Alloy*

The group also actively participates in and has earned the recognition of prestigious international forums such as the European Powder Metallurgy Association-EPMA and its American homologues MPIF-Metal Powder Industrial Federation, APMI-American Powder Metallurgy Institute and ASM-A Society for Materials. Emphasize the recognition in electrochemical area (ECS-Electrochemical Society) due to the continued and actived participation in these forums.

Some of the most relevant R&D&I projects of the group are:

- Development of self-healing monolayer coatings with high anticorrosion properties.

*Funding entity: Ministry of Science and Innovation. Fecha: 2010-2013.*



*Corrosion test for automotive ABS rings manufactured using powder technology*

- Processing by association of colloid-chemical and power-metallurgical techniques of metal-ceramic nanocomposite structures. (COMETAS)

*Funding entity: Ministry of Science and Innovation. Fecha: 2010-2012.*

- Development of mechanically alloyed yttria oxide strengthened Fe-base superalloys for application in target window in accelerated driven systems (ADS)

*Funding entity: Ministry of Science and Innovation. Fecha: 2010-2012.*

- Development of advanced gamma TiAl alloys for components with high reliability: microstructure design and modelling of the mechanical behavior (DATIAL)

*Funding entity: Ministry of Science and Innovation. Fecha: 2010-2012.*

- Advanced Structural Materials (ESTRUMAT)

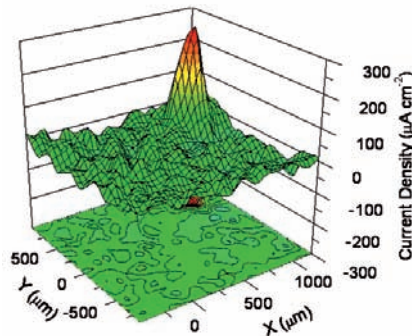
*Funding entity: Community of Madrid . Date: 2006-2009 y 2010-2013.*

- Development of a new generation of tool materials using powder metallurgy processing.

*Funding entity: Ministry of Foreign Affairs and Cooperation. Date: 2010-2010.*

- ELENA: "Electroceramics from Nanopowders Produced by Innovative Methods"

*Funding entity: European Science Foundation. Date: 2005-2009.*



*SVET Map for a powder metal aluminum 2124 test-tube after 5 hours of immersion in an aeronautic environment simulation solution*



*Stainless steel 17-4 PH particle treated by HIP (Hot Isostatic Pressing)*

- New powder metallurgical materials for the land transport industry.

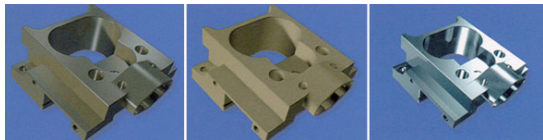
*Funding entity: Ministry of Education and Science. Date: 2006-2009.*

- Development of Materials for Metal and Metal-Ceramic Filters

*Funding entity: European Union. Date: 2006-2007.*

## • INNOVATIVE TECHNOLOGICAL SOLUTIONS •

- Low-cost Titanium Alloys and Method for Preparation thereof. Patent WO2010015723
- Intermetallic-reinforced Stainless Steels. Patent ES2146168.
- Method for the manufacture of Metal Parts from Metal Powder using Heat-setting Acrylic Resins as Binder. Patent ES2167130.
- Steels sintered with Nickel Silver. Patent ES2211248.



*Green compact, brown compact and sintered material in a powder injection molding process.*

- Electrodes for the Electrochemical Recognition of Ion or Molecular Species based on Polysiloxane Membranes and the Method for Preparation thereof. Patent ES2160052 (under co-ownership with CSIC).
- Multifunctional Coatings applying Sol-gel type Technologies. Patent application P200802175 (under co-ownership with CSIC).
- Low-cost Ti Alloys. Patent application P200802403
- Method for obtaining Metal Foam. Patent application P200900087 (under co-ownership with CSIC).
- Process for the manufacture of Metal and Ceramic Parts by means of Powder Injection Molding using a Thermoplastic Binding System based on Rapidly Removable Polysaccharides. Patent application P20090194.

## • TECHNOLOGICAL EQUIPMENT •

The group has highly qualified personnel with proven experience in providing material analysis, characterization and property measurement services.

Their laboratories are perfectly equipped to meet any requests according to strict quality criteria:

- Powder Technology Laboratory
- Structural and Microstructural Characterization Laboratory
- Thermal Analysis Laboratory
- Mechanical Characterization Laboratory
- Surface Engineering Laboratory
- Injection Molding Laboratory
- Thermocalc and DICTRA Thermochemical and Kinetic Equilibrium Calculation Software

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IMAGE OF COVER: *Composition Inconel 718 and Parts*