



**Materials Industrial Research
& Technology Center**

**PRODUCTION
OF ADVANCED CERAMIC MATERIALS**



MIRTEC AT A GLANCE

Materials Industrial Research and Technology Center is a multi-sectoral Technological Center for the Applied Research, Technological Development, Certification & Quality Control in a wide range of materials and products. The company offers integrated solutions supporting Industry through leading edge technologies.

MIRTEC is an Accredited Certification Body, a Notified Body for Products Certification in EU (NB. 0437) and Member of international certification networks as the IQNet, the Oeko-Tex Association, the IECEE CB Scheme for ENEC & CCA and the HAR Group. The company owns labs, accredited to ELOT EN ISO/IEC 17025 and provides integrated solutions to the Industry, focusing on competitiveness and growth enhancement.

Established collaborations with European Research Centers constitute a high performing technological network in certain industrial sectors dealing with metals, ceramics, refractories, construction materials, polymers, textiles as well as in recycling and circular economy projects.

During long course of professional and research activity, the company has accumulated precious knowledge and experience and today produces several innovative products with tailor made properties for EU and USA market.

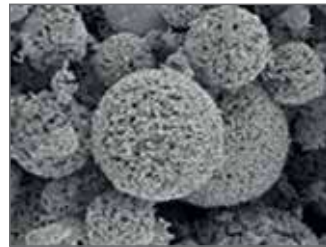
MIRTEC S.A.

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Advanced ceramic powders & custom designed parts

- Special ceramic materials with low thermal expansion coefficient
 - NZP (Sodium Zirconium Phosphate family)
 - Tialite & modified tialite
 - Cordierite
- Electronic ceramics and Y(Re)BCO
- Tailor made compositions with controlled characteristics

- Controlled particle size
- Agglomerated particles through spray drying
- Shaped bulk ceramics in the form of crucibles, tubes, discs, etc.
- Custom designed parts





Spherical agglomerated- Spray dried powders of tailor made compositions

Homogeneous and high purity Spray dried powders suitable as feedstock material for processes requiring controlled powder flowability

Compositions:

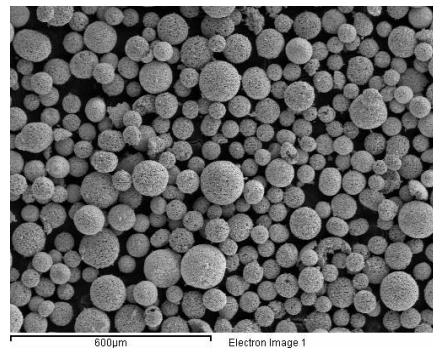
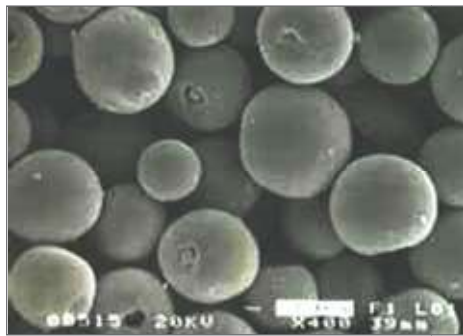
- ITO, NZP, tialite, modified tialite, hydroxyapatite, Y(Re)BCO etc.
- Custom designed compositions

Applications:

- Ready to press powders
- Feedstock for deposition of thermal spray coatings
- For Sputtering targets

Services we offer

- Transfer from development phase to pilot scale production
- Production under request
- Use of commercial powders or custom designed compositions





Special ceramic materials with low thermal expansion coefficient

Available in powder form but also as ceramic components

Compositions:

- Cordierite
- Zircon mulite based
- NZP (Sodium Zirconium Phosphate family)
- Tialite, modified Tialite

Special characteristics:

- Zero or adjustable low thermal expansion coefficient
- Exceptional thermal shock resistance
- High mechanical strength even with increased porosity
- Thermal stability
- High melting temperature
- Corrosion and oxidation resistance

Ideal for high demanding applications:

- Furnace parts
- Thermal barrier coatings
- Catalysts supports, diesel particulate filters
- Honeycomb, foam or other porous structures
- Crucibles



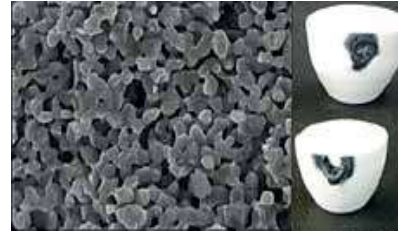


NZP → An incredible material with Zero & tailorable thermal expansion coefficient

Belongs to Sodium Zirconium Phosphate family

Unique combination of exceptional properties

- Zero and tailorable thermal expansion coefficient
- Exceptional thermal shock resistance
- Low thermal conductivity
- High electrical resistivity
- High melting temperature (>1800 °C)
- High mechanical strength
- Thermal stability
- Excellent machinability



Available in:

- Powder form in grades for high density and low density parts
- Customized ceramic components

Ideal for demanding applications:

- Furnace parts for advanced sintering applications
- Moulds for demanding forming processes (*e.g. field assisted or electric current activated/assisted sintering techniques, extrusion dies*)
- Components for Semiconductor and Laser equipment
- Engine exhaust parts
- Thermal barrier coatings
- Crucibles, catalysts supports & diesel particulate filters

POWDER CODE	MN27-LD1	MN27-HD1
POWDER		
Particle size	D50 <10 microns	D50 <10 microns
	<i>*smaller particle sizes or spherical agglomerated particles can be also produced under request</i>	
BET Surface area	3,0-4,5 m ² /g	3,0-4,5 m ² /g
PHYSICAL PROPERTIES OF SINTERED SAMPLES		
Porosity (%) (Archimedes method)	36 (tailorable)	1 (tailorable)
Melting Temperature (°C)	>1800°C	>1800°C
Thermal Expansion	Down to 0 @ 1100°C (tailorable, depending on formula)	Down to 0 @ 1100°C (tailorable, depending on formula)
Heat capacity	0,52 J/(gK) (RT) 0,66 J/(gK) (300°C)	0,48 J/(gK) (RT) 0,63 J/(gK) (300°C)
Thermal Conductivity	0,32 W/m K (25°C) 0,37 W/m K (300°C)	1,1 W/m K (25°C) 1,1 W/m K (300°C)
Electric Resistivity	8 · 10 ⁻¹³ Ω.cm (25°C)	6 · 10 ⁻¹⁴ Ω.cm (25°C)

Conventional Thermal spray techniques for thick coatings

- Atmospheric plasma spray (APS)
- Low pressure plasma spray (LPPS)
- High Velocity Oxygen Fuel (HVOF)
- Use of commercial and custom designed ceramic powders

Innovative thermal spray techniques for thin & thick Coatings

- Suspension plasma spray (SPS)
- Solution precursor plasma spray (SPPS)
- Ink jet assisted plasma spray (IJA-SPS/SPPS)
- Use of custom designed liquid feedstocks: solutions, suspensions



Coatings characteristics:

- Homogeneous lamellae-free microstructure
- Nanostructural features on rough or polished substrates

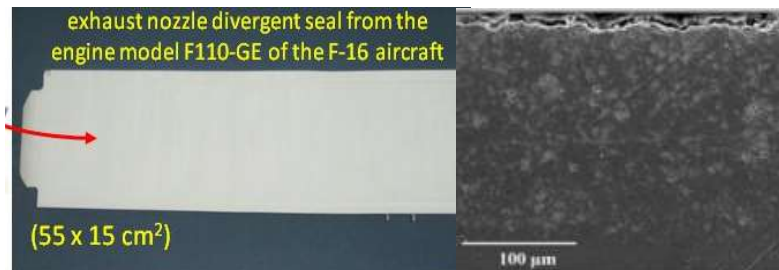
Applications:

- Thermal barrier coatings for aircraft engine parts
- Thermal barrier coatings for improved racing car performance
- Functional electrolyte coatings for SOFCs
- Sputtering targets, planar & cylindrical for the deposition of thin films
- Bioceramic coatings for biomedical applications (Hap)
- WC-Co based plasma spray coatings for wear and corrosion resistance
- Low pressure plasma spray coatings of metals/alloys (MCrAlY, Ti)

- YSZ TBC systems for engine and exhaust parts
- Use of zirconium based oxides in multi-layered systems
- Multi-layered systems with low & adjustable thermal expansion coefficient

They provide:

- Thermal insulation with simultaneous higher hot gases temperature
- Improved engine efficiency & performance corrosion protection
- Good thermal shock and cycling behavior in service temperature up to 1200 °C





Ceramic targets for sputtering & ablation

- Thermal sprayed ceramic sputter test targets, in planar and rotatable shape with tailor made composition for specific sputtering applications.
- Bulk sputtering and ablation targets of tailor made composition
- Spray dried powders of tailor made composition used as feedstock for thermal sprayed targets are also developed and produced in pilot scale.





*.... We are driven by your unique needs
to find innovative solutions
utilizing our expertise and technology capabilities
in materials processing*

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