



Micro and Nanocrystalline Functionally Graded Materials for Transport Applications

MAIN GOAL: to develop, characterise and model
novel metal-ceramic functionally graded materials

FGM I: Alumina ceramics and copper or copper alloy

FGM II: Alumina ceramics and nickel-aluminum intermetallics



Project Coordinator

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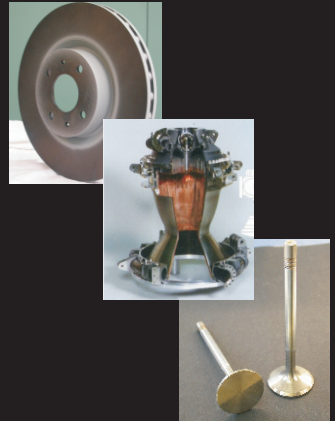
PROJECT OVERVIEW

Aerospace and Automotive Applications:

I. Exhaust and propulsion systems (e.g. Thrusters);
required material properties: enhanced resistance to high temperature, thermal shocks, wear, oxidation and corrosion.

II. Power transmission systems (e.g. Valves);
required material properties: low specific weight, resistance to high temperature, resistance to wear and corrosion.

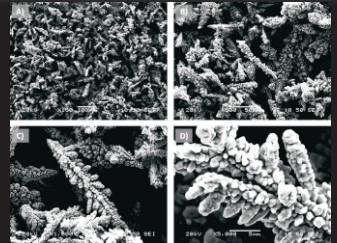
III. Braking systems (e.g. Brake disks);
required material properties: resistance to high temperature, friction and wear, high bending strength in room temperature and high temperature regimes, enhanced thermal conductivity, structural stability in temperature cycles, lower specific weight.



MATERIALS AND METHODS

Processing methods

- Powder metallurgy (MA, HP, HIP, SPS)
- High Velocity Oxygen Flame spraying
- Cold spraying
- Plasma arc spraying
- Foil casting, slip casting
- Pressure-assisted infiltration of ceramic preforms
- Pressureless infiltration



Characterisation of microstructure and properties

- SEM / TEM / AFM, micro-CT, synchrotron radiation CT
- Oxidation, corrosion, wear, fracture
- Thermal properties
- Residual stresses

Modelling of FGM design and properties



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