**HIMOLO**: Intermetallics for High, Moderate and Low temperature applications

- Definition and optimisation of new processing routes for TiAl, FeAl
- Characterisation and modelling of obtained materials

**TiAl**: Self propagating High Temperature Synthesis

**FeAl**: Two stage reaction sintering

**Modelling of Nb₃Sn for ITER**, Validation based on experiments

**LMI strand**

**PROJECT PARTNERS**

- UM (Metz, F; Coordinator), INASMET (San Sebastian, S), IFM (Gliwice, PL), ONERA (Chatillon, F), EADS (Paris, F), IPPT (Warszawa, PL), UNIPAD (Padova, I), IMBAS (Sofia, BG), AGH (Krakow, PL), UH (Hatfield, UK), LMT (Cachan, F), UNIVPM (Ancona, I), MCL/MUL (Leoben, A)
**FIMLA: Thin Films and Intermetallic Layers**

**Production of intermetallic coatings using a duplex treatment**

- NiAl Layers
  - Retain the mechanical properties of the substrate

- TiAl Layers
  - Remain stable after exposure to H₂S (O&G Industry)

- NiTi Layers
  - Complex Industrial shapes can be coated

**Improvement of Materials Surface Properties**

- NiAl Layers
  - Improve the wear resistance of Inconel 600 alloy

- TiAl Layers
  - Improve the wear resistance of titanium alloys

- NiTi Layers
  - Pressure vessels for H₂S exposure

**PROJECT PARTNERS**

- merl
- CIDETEC
- CENTRO RICERCHE FIAT
- WARSAW UNIVERSITY OF TECHNOLOGY

**Ni-Ti layers:**
- Microhardness
- Friction
**Nitibit**

**Processing**
- Multi-stage low-cost processing methods optimised to produce dense OR porous, high purity NiTi SMA with required phase transformation
- Properties tailored to requirements using **Impulse Electric Current Treatment**
- **Scaleup to series production (>100 parts).** Demonstrator produced for automotive application

**Characterisation**
- Hemo- and biocompatibility of NiTi SMA could be improved by **bioactive coatings or plasma immersion ion implantation**
- Preliminary **biocompatibility tests** in simulated body show good biocompatibility

**Modelling**
- Multiscale model of pseudoelastic behaviour to simulate response of NiTi (non-proportional loading paths)
- Numerical analysis of non-uniform response of polycrystalline NiTi (quasi-static and dynamic loading)
New concepts in processing and testing of ceramics and metal-to-ceramics joints

- Non conventional tests and life prediction
- New flat and circular joint technologies and new mechanical tests
- New technology to join C/C to Cu in a single step process, on circular surfaces; New joining material for fuel cells

Comparison and validation of the design by modelling and testing of joined parts in working conditions

- FEM calculation for the residual stress in a C/C-Cu joint
- Monitoring of simultaneous delamination and debonding processes
- Residual stresses of C/C to Cu joints by direct passage of electric current

Project Partners

- POLITO (Coord., Torino, I), LMT (Cachan, F), MERL (Hertfordshire, UK), NETCOM (Chesterfield, UK), POLIMI (Milano, I), ALENIA (Naples, I), FIAT (Torino, I), IMRSAS (Kosice, Sk), IPSUA (Kyiv, Ukr), UNIVPM (Padova, I), INASMET (San Sebastian, S)