

MATEIS : MATériaux, Engénierie et Science

Patrice Chantrenne

UMR CNRS 5510 : Départements INSIS (section 9) et
INC (section 15); sections CNU 28, 11 et 62

60 researchers, 29 administrative and technical staff

- 6 teams
 - METAL: Metals and alloys
 - PVMH : Polymers, glasses and heterogeneous materials,
 - CERA : Ceramics and composites
 - SNMS : Nano and micro-structure
 - I2B : Material and biologic interactions
 - CorrIS : Corrosion and surface Engineering
- Main axes in NAME
 - Elaboration : material processing
 - Properties measurement : structural characterisation, mechanical properties
 - Simulation : multiscale simulation



N A M E

GDR Nanomaterials for Energy Applications

ELABORATION
MEASUREMENTS & METROLOGY
SIMULATIONS & THEORY
APPLICATIONS



Scientific expertise, overview, major themes in relation to the GDR

- **Multi scale simulations**

- Atomics scale : MD
- Mean field, finite elements and finite differences

(LAMMPS, ABAQUS, ANSYS...)



Simulation of material processing, heat and mass transfer, mechanical deformations to understand the physical phenomena leading to the final microstructure

- **Micro and Nano structure**

- Our lab is in charge of the management of an electronic microscopy structure (CLYM)
- Tomography



In situ observation of structural changes during mechanical tests and or thermal treatments in different environment



Identify the physical phenomena leading to the structural changes

Technical or technological expertise in relation to the GDR issues

- **elaboration techniques**

Powder fabrication
Sintering (from nanopowders)



The goal is to manage the whole process
to get a controlled nano/microstructure

Porteurs d'énergie
Phonon
Type de conversion d'énergie
Electro-chimique
Application relative à l'énergie ou autre
Matériaux pour le nucléaire
Matériaux pour le transport (moteurs, turbines,...)
Matériaux pour le stockage d'énergie (batterie)
Biomatériaux (prothèses, ...)
Matériaux super isolants thermiques
...

Caractéristiques physicochimiques
Caractérisation microstructurale
Mécanique
Type et taille caractéristiques des nanomatériaux
Élaboration : mm - cm
Caractérisation d'objets: du nm au cm
Simulations: du nm au cm, métaux, céramiques, polymères