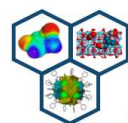


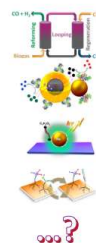
Unité de Catalyse et de Chimie du Solide (UCCS UMR CNRS 8181)

Key figures:

115 researchers, 40 ITA
~200 peer reviewed publications/year
10 researchers involved in the GdR (Solid State Chemistry)



institut Chevreul



Core expertise & thematics of the Lab

Chevreul Institute
Transversal thematics

Bioeconomy

Energetic challenges

Advanced materials

Incipient transversal thematics

Biogaz upgrading

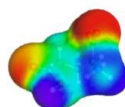
Hybrid catalysis

Photochemistry

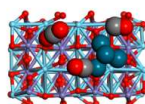
CO₂ upgrading

Thematics survey

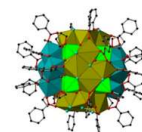
Departments



Catalysis & Molecular Chemistry



Heterogeneous Catalysis



Solid State Chemistry



ENVIRONMENT



ENERGY



SUSTAINABLE DEVELOPMENT

SOLID STATE CHEMISTRY



CIMEND

CHEMISTRY, MATERIALS AND PROCESSES FOR A SUSTAINABLE NUCLEAR DEVELOPMENT



CMNM

THIN FILMS & NANOMATERIALS



MATHYB

HYBRID MATERIALS



MISSP

INORGANIC MATERIALS, STRUCTURES, SYSTEMS AND PROPERTIES



RM2I

NMR AND INORGANIC MATERIALS



GDR Nanomaterials for Energy Applications

N A M E



UNITÉ DE CATALYSE ET
 CHIMIE DU SOLIDE
 UMR CNRS 8181

AXE

Élaboration

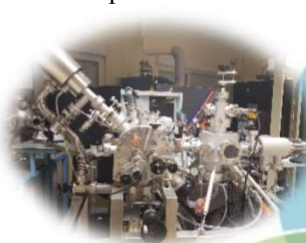
Mesures de propriétés



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

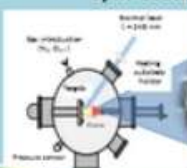
Thin Films and NanoMaterials Team

PLD coupled with RHEED



Synthesis

Pulsed Laser Deposition
Spin-Coating



Application

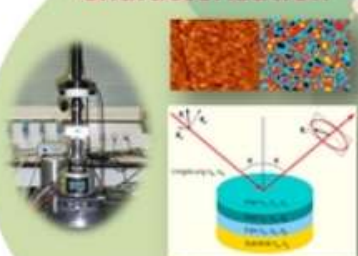
Nano-devices for
electronics, optics,
energy...

Focused on the « Nano » world

Development of thin films and
nanomaterials with specific and / or
multifunctional properties for the fields
of nanoelectronics, optics and energy.

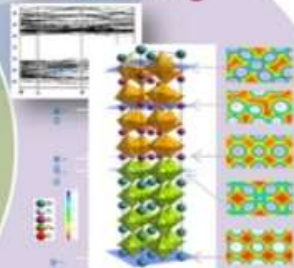
For several years, development, synthesis and
characterizations on a local scale of new piezoelectric
oxides in thin films ($\text{Ln}_2\text{Ti}_2\text{O}_7$ and Ln_2WO_6)

Characterization



Scanning Probe Microscopy
Spectrometry
Ellipsometry

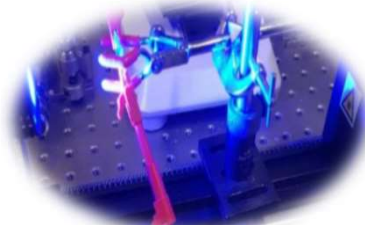
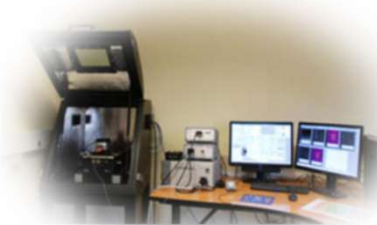
Modeling



Molecular modeling
Ab-initio calculations

Characterization at the local level (AFM, PFM,
piezocycles, conductive-AFM ...)

Photo-current / Photoelectrochemistry



8 researchers:

Jean-François Blach, Pr
Marie-Hélène Chambrier, MCF
Rachel Desfeux, Pr
Anthony Ferri, MCF
Jean-François Henninot, Pr
Christian Mathieu, Pr
Sébastien Saitzek, Pr (team manager)
Adlane Sayede, Pr (associate director)

Type of materials:

Oxides, heterojunctions all-
oxide,
Hybride materials
(polymer/oxide et liquid
crystal/oxide)

Porteurs d'énergie

Electron

Photon

Type de conversion d'énergie

Photovoltaïque

Piézoélectrique

Application relative à l'énergie ou autre

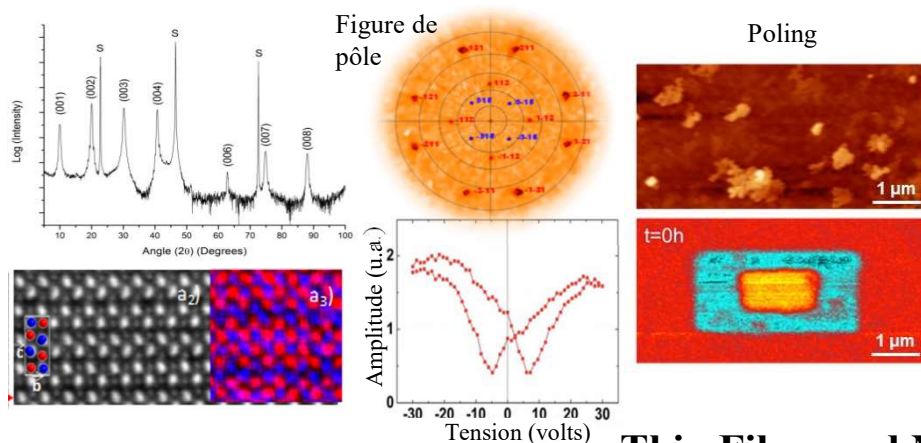
Récupération

Capteurs

GDR Plenary meeting may 2021 <https://gdrname.fr>

Examples of studies related to energy

- Piezoelectric materials with complex structures and eco-responsible ($\text{Ln}_2\text{Ti}_2\text{O}_7$ or Ln_2WO_6)



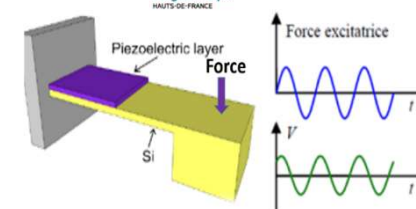
Thin Films and NanoMaterials Team

Région STIMuLE – 2020-2024

- Optimization of the Piezoelectric Properties of eco-acceptable functional oxides for energy recovery

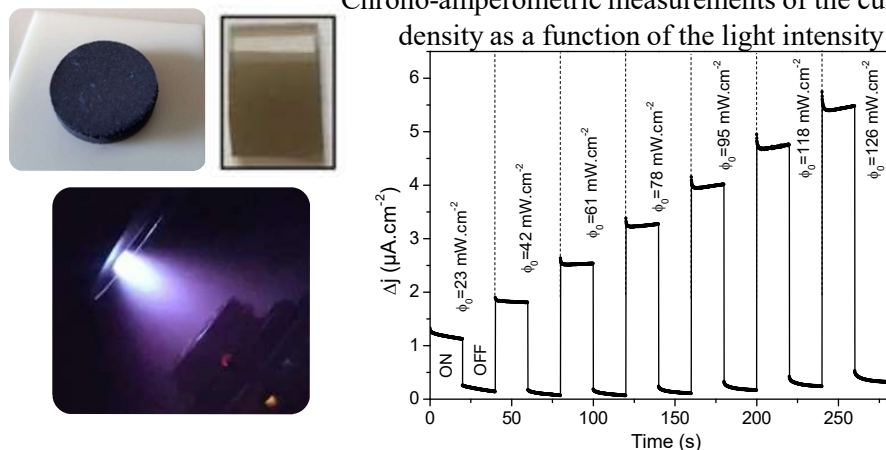


Build a demonstrator to assess the performance of thin films in terms of energy recovery

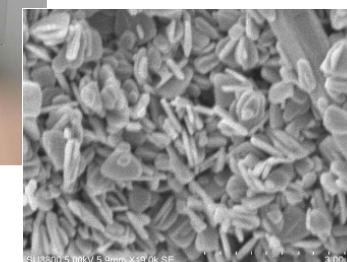
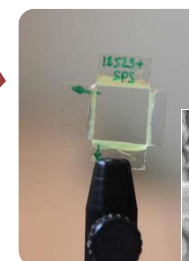
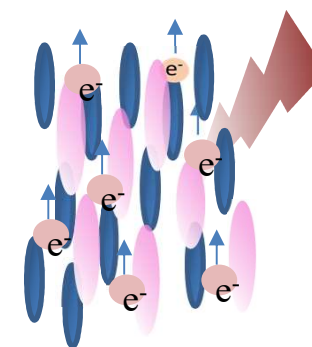


- Development of photoanodes $\rightarrow \text{M}_2\text{V}_2\text{O}_7$ pyrovanadates ($\text{M} = \text{Cu}, \text{Zn}, \text{Mg}, \text{Co}, \dots$)

Chrono-amperometric measurements of the current density as a function of the light intensity



- Suspension of nano-objects in a self-organized system for the conversion of light energy



GDR Plenary meeting may 2021

<https://gdrname.fr>

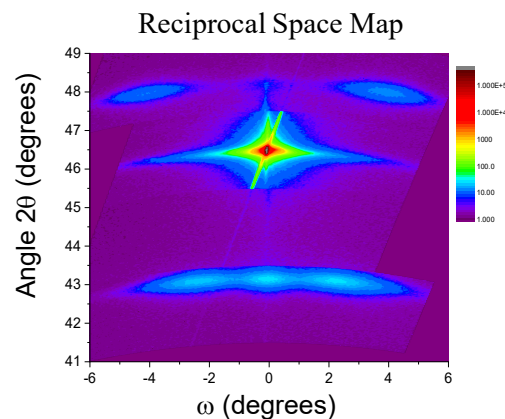


Scientific expertise, overview, major themes in relation to the GDR

The objective to develop new material for various applications (spintronic, luminescent materials, oxidation catalysis, photocatalysis for hydrogen production, ...).

2 researchers:
Marielle Huvé, Pr
Pascal Roussel, DR

➔ Advanced structural and microstructural characterizations



Porteurs d'énergie

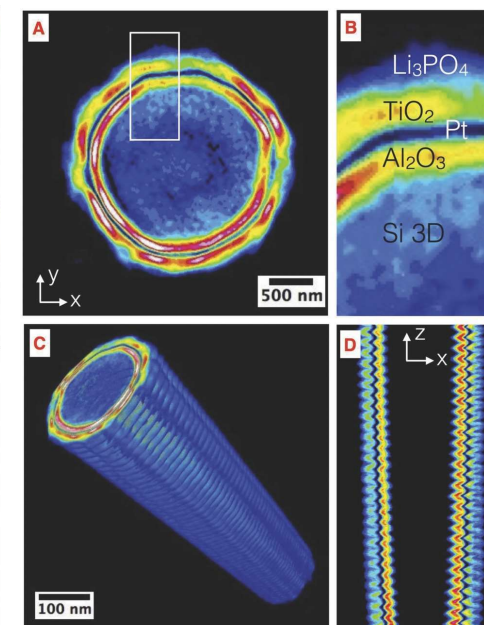
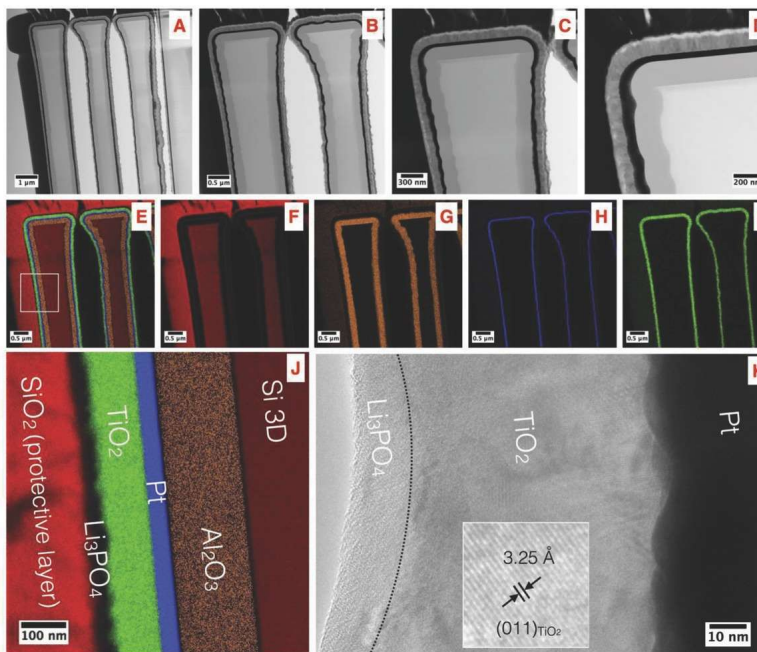
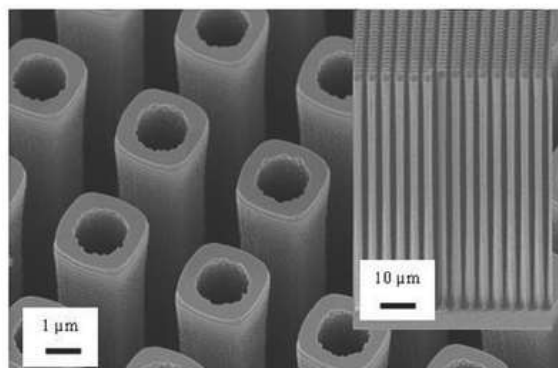
Electron

Application relative à l'énergie ou autre

Stockage

Approche multitechnique
(SEM/TEM/nanoTomoX) pour la
caractérisation avancée de
microbatteries Li-ion

Collaboration with
Ch. Lethien



Technical or technological expertise in relation to the GDR issues

- Nanoparticules (<100 nm) and thin films (<200 nm)
- Sol-Gel coupled with spin-coating technique, hydrothermal method (Bottom-up) or Pulsed Laser Deposition/RHEED (top-down)
- HR-XRD (SmartLab Rigaku), MEB (Hitachi SU3800) coupled X-ray Fluorescence, AFM (MFP-3D Asylum), Raman Spectroscopy, TEM Titan Themis (FEI), Ellipsometry (Horiba), Photo-electrochemical and impedance spectroscopic analysis (Metrohm).
- Codes/numerical tools/modelling : DFT, IA-GAN, Genetic algorithm

Caractéristiques physicochimiques

Caractérisation microstructurale

Electrique

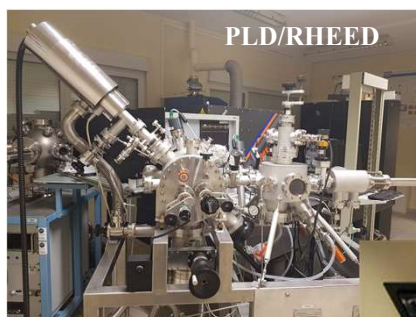
Photoelectrochimique

Type et taille caractéristiques des nanomatériaux

Élaboration

Caractérisation d'objets

Simulations



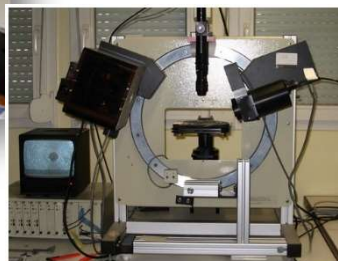
PLD/RHEED

MFP-3D Asylum

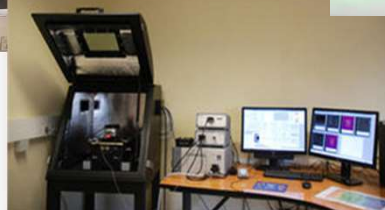
Photo-electrochemical module + Solar Simulator



Ellipsometry



MEB



XRD Smartlab Rigaku



TEM Titan Themis

institut
Chevreul