



RÉSEAU FRANÇAIS DU FLUOR



Physicochimie des Electrolytes, Colloïdes et Sciences Analytiques (PECSA)

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Keywords : energy storage and conversion, inorganic materials, molten salts, simulation, F₂

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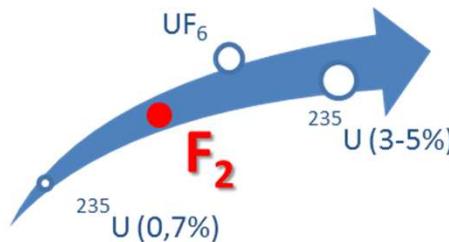


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Preparation of fluorine gas from electrolysis of molten KF-2HF



Background: - F_2 is a key element within the nuclear cycle - it is used for the ^{235}U enrichment.
- Elemental fluorine is produced from electrolysis of molten KF-2HF.

Aims: - Comprehension of the electrochemical process involved during the F_2 formation
- Improvements of the process and optimization of the electrolyzers

Methods: Electrochemical measurements (impedance measurements, cyclic voltammetry,...), X-ray diffraction, XPS, solid-state NMR...

Publication: « Fluorinated Materials for Energy Conversion », T. Nakajima and H. Groult (éds.), Elsevier, (2005). ISBN : 0-08-044472-5.

Collaborations: A. Tressaud, E. Durant & C. Labrugère (ICMCB), M. Dubois (Clermont Université)

Fundings: Industrial contract (Areva-Comurhex).

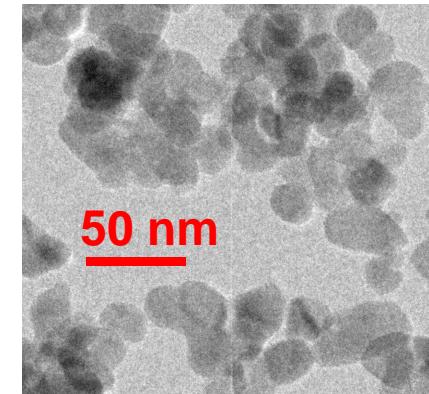


Fluorinated compounds as electrode materials for batteries (Li^+ , Na^+ , and F^-)

Background: Transition-metal (oxy-)fluoride compounds displayed unique physico-chemical properties of interest for electrochemical energy storage applications.

Aims:

- Development of new synthetic protocol to prepare nano-sized transition metal oxyfluorides,
- Evaluation as electrode for rechargeable Li and Na batteries,
 - Explore new electrochemical devices based on F^- shuttle.
 - Identifying electrochemical storage mechanism.



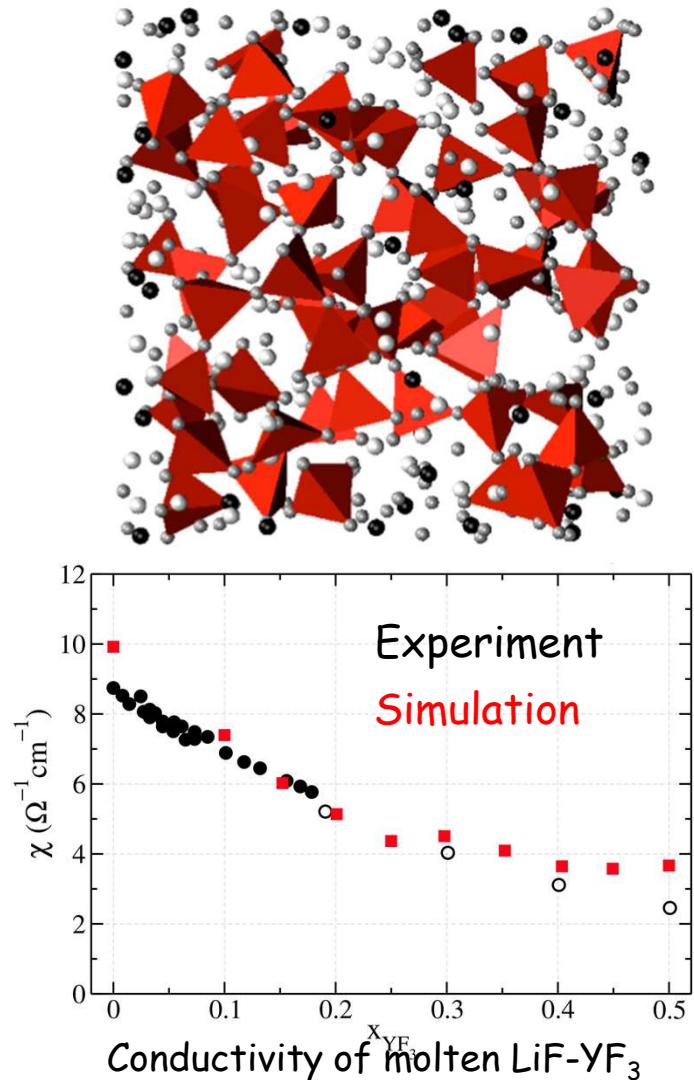
Methods: solvothermal synthesis, x-ray and synchrotron diffraction, total scattering method, galvanostatic measurement, impedance spectroscopy, solid-state NMR.

Collaborations: K. Chapman/P. Chupas (Argonne Lab. (USA)), A. Demourgues (ICMCB), C. Legein/V. Maisonneu (Univ. Du Mans), K. Zaghib (HydroQuébec, Canada), Iwate University, S. Komaba (Tokyo University of Science).

Fundings: ANR (FluoBat), industrial contract (HQ), European project, UPMC.



Fluorinated molten salts - Molten salts reactor



Background: - Use of molten salts reactor fuel.

Aims:

- Optimization of the molten salts reactor
- Knowledge on the electrolyte properties
- Prediction of thermodynamic quantities (heat capacity, viscosity, electrical and thermalconductivity)

Methods:

- Modelisation coupled with experimental measurements

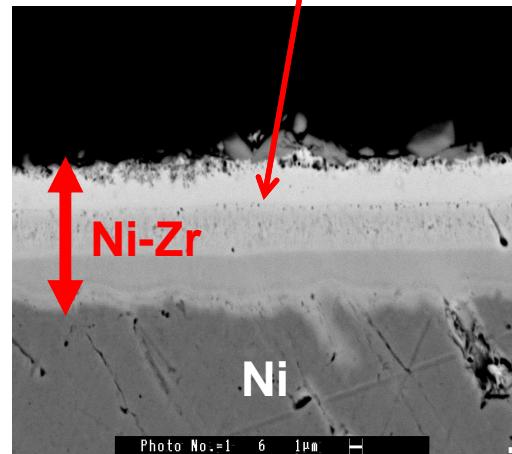
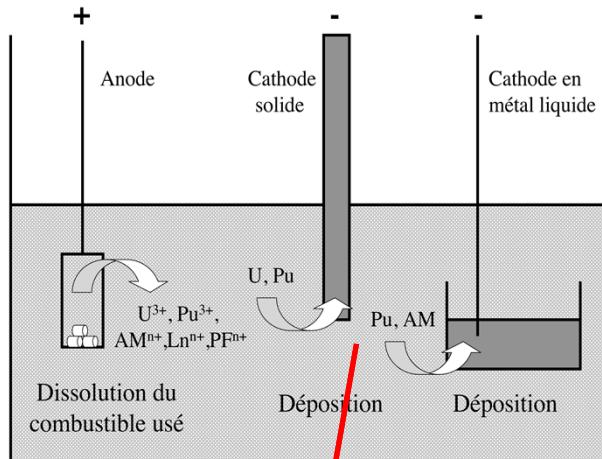
Collaborations:

Paul Madden (Oxford), Catherine Bessada (Orléans),
Norikazu Ohtori (Niigata)

Fundings:

ANR MILIFOX, European Project EVOL.

Fluorinated molten salts - refining



Aims:

- Use of molten salts in the field of nuclear energy
- Refinement of nuclear wastes form molten fluorides

Methods:

- Electro-reduction process in molten fluorides
- Experiences/modelisation

Collaborations: Paul Madden (Oxford), Catherine Bessada (Orléans), Norikazu Ohtori (Niigata), Takuya Goto (Japon), Abdeslam Barhoun (Maroc)

Fundings: UPMC, CNRS, European project SACSESS