

# Expertises

## Synthesis of fluorinated materials

### SYNTHESIS IN FLUORINATED ATMOSPHERE:

- $F_2(g)$
- $HF(g)$ , aqueous  $HF$
- Solid fluorinated reagents ( $TbF_4$ ,  $XeF_2$ , ...)
- Under  $UF_6$  atmosphere



### FUNCTIONALIZATION USING FLUORINE:

- Surface treatment of commercial polymers and carbonaceous nanomaterials
- Functionalization of commercial polymers
- Synthesis of fluorinated graphene and fluorinated nanofillers

### ELECTROCHEMICAL EXFOLIATION OF GRAPHITE FLUORIDES

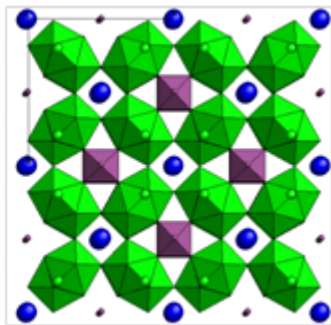
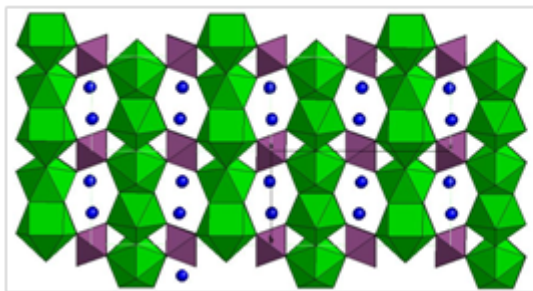
### SYNTHESES WITH SOLID AND LIQUID ROUTES:

- Hydrothermal and microemulsion methods

## Study of the structure of fluorinated materials

### CRYSTAL CHEMISTRY OF FLUORIDE:

- Chemistry of fluorophosphates, terbium fluorides, uranium fluorides and oxyfluorides
- Syntheses and characterization of fluorides and mixed valence oxyfluorides



## CHARACTERIZATION OF FLUORINATED MATERIALS:

- X-ray diffraction with single crystals and powders
- Raman spectroscopy
- Solid state nuclear magnetic resonance ( $^{19}\text{F}$ ,  $^{13}\text{C}$ ,  $^1\text{H}$ , ...) and Electron paramagnetic resonance
- $\text{N}_2$  adsorption

## Evaluation of the applicative properties of fluorinated materials

- Evaluation of the electrochemical performances in lithium batteries (galvanostatic cycling at various temperatures, cyclic voltamperometry, EIS, in situ XRD- electrochemistry, raman-electrochemistry, ESR-electrochemistry)
- Wettability (superhydrophobicity, printability, adhesion)
- Interaction with solvents, ionic liquids, polymers
- Capacities of filtration/sensibility to polluting gas -Evaluation of the tribological performances (sliding tests at temperatures in between RT and  $400^\circ\text{C}$  under controlled amount of humidity)

## Chemistry of gaseous, liquid and solid uranium fluorides

- Adsorption of gaseous fluorides
- Syntheses and characterization of uranium fluorides and mixed valence oxyfluorides

<https://iccf.uca.fr/english-version/research/inorganic-materials/fluoridation-and-fluorinated-materials/expertises>