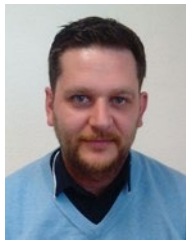


UMR-CNRS 6296 - Institut de Chimie de Clermont-Ferrand
Equipe « Matériaux Inorganiques »
Thématique « Fluoration et Matériaux fluorés »
Université Clermont Auvergne,
24, avenue Blaise Pascal, 63171 Aubière, France

Keywords : Synthesis, fonctionnalization, fluorine atmosphere, inorganic (nano)fluorides, fluorinated (nano)carbons, high-pressure, energy storage, catalysis, lubrication, nanocomposites, gas sensors

Principal Investigators: Nicolas Batische¹, Pierre Bonnet¹, Daniel Claves¹, Marc Dubois¹, Malika El-Ghozzi¹, Katia Guérin-Araujo da silva^{1,*}, Laurent Jouffret², Kevin Lemoine²



Affiliation: ¹ Université Clermont Auvergne, ² CNRS

*MINES Paris, PSL University, PERSEE

Fluorinated materials for energy and environment

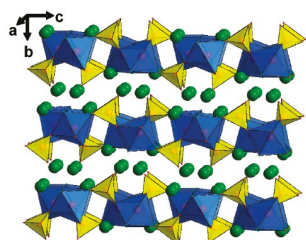
Aim : To prepare new or nanostructured / nanoporous materials for energy through gaseous fluorination processes

Methods:

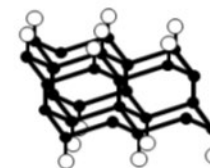
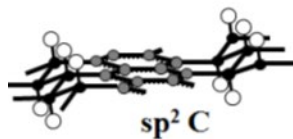
- ✓ Synthesis in fluorinated atmosphere $F_2(g)$, anhydrous or aqueous $HF(aq,g)$, catalytic atmosphere, using solid fluorinated decomposition (TbF_4 , XeF_2 , ...) or fluorinated plasma
- ✓ Fluorinated nanocarbons as electrode materials for primary lithium batteries
- ✓ Nanostructured metal fluorides or oxyfluorides as electrode materials for secondary lithium batteries and photo/electrocatalysis
- ✓ New fluorinated inorganic materials obtained by high-pressure synthesis

Partners: SAFT, Centre National d'Etudes Spatiales (CNES), SAFRAN, ORANO, IFPEN, UMICORE

Collaboration : Julien Parmentier, Camélia Ghimbeu, IS2M (Univ. de Haute Alsace), Nicolas Louvain, Institut Charles Gerhardt Montpellier (Univ. Montpellier), Sandrine Berthon-Fabry (MinesParis), Patrice Simon, CIRIMAT (Univ. Paul Sabatier), Gary J. Schrobilgen, McMaster University (Hamilton, Ontario), Alain Demourgues, ICMCB (Univ. Bordeaux I), Fannie Alloin, Cristina Iojoiu, LEPMI (Univ. Grenoble) Yoshiyuki Inaguma Gakushuin University (Tokyo)



Na_2FePO_4F



Fluorinated nanocarbons

Surface Engineering

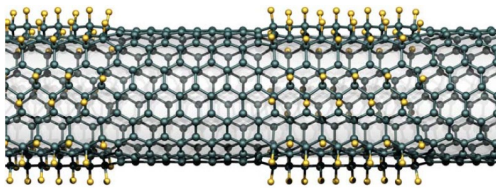
Aims : Synthesis and functionalization in fluorinated atmosphere of inorganic (nano)fluorides and fluorinated (nano)carbons for lubrication and nanocomposites (fluorinated nanofillers)

Method:

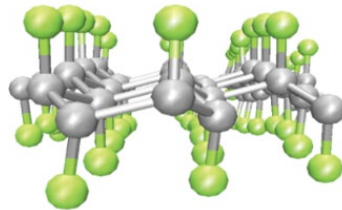
- ✓ New methods for fluorination
- ✓ Fluorination of carbonaceous (nano)materials for tribology
- ✓ Fluorination of graphene, carbon nanotubes, nanofibres and nanodiscs
- ✓ Preparation of fluorinated nanocarbon/polymer composites
- ✓ Surface treatment of polymers to reach multifunctionality (hydrophobicity, gas barrier for CO_2 , O_2 and water, antibacterial, ...)

Partners: Valfleurier, GILSON, SOLVAY

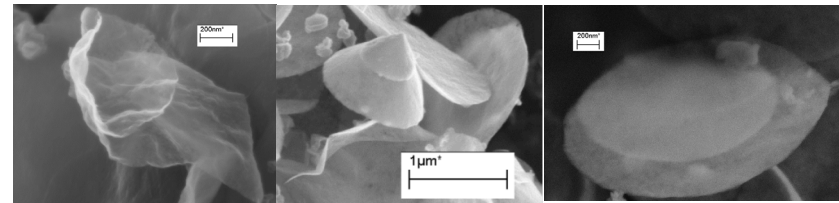
Collaborations : Naoki Komatsu, Shiga University Medical Science (Japon), Monica Cracium, Saverio Russo, University of Exeter (UK), Cong Wang, Université de Baihang (Pékin), Philippe Thomas, GTSI (Univ. des Antilles et de la Guyane), Frédéric Guittard, Nice Sophia Antipolis,



Fluorinated SWCNTs (F_2)



Fluorinated graphene



Graphene materials obtained by fluorination/defluorination processes