

SEMINAR

Thursday, 4.4.2024, 13:00, Kolar's Lecture Hall

Chemical and Electrochemical Synthesis and Characterization of Functional Materials

Dr. Laura, Marie Adam (Lorraine University, Metz, France)

Chemical and electrochemical processes are powerful ways of synthesis since they are low-cost and easy to set up. These processes allow the obtention of various materials (multi-elements materials, metallic alloys, semi-conductors, ...) for different application such as anti-corrosion, energy, sensing and so on. The materials can be nanostructured using hard or soft template or even without template. However, these techniques still present some challenges to control the structuration, the crystallinity and the chemical composition of the deposits for instance.

The first part of my presentation will be devoted to the synthesis of low-dimensional thermoelectric materials in ionic liquids and in aqueous media. The challenges for these materials are the nanostructuration to decrease the thermal conductivity and the control of the crystallinity for the electronic properties (Seebeck coefficient and resistivity).

I will focus especially on the mechanism of formation of these materials. On one hand, nanowires of tellurium were obtained by electrodeposition in ionic liquid. Afterwards, they were chemically converted into either silver telluride (Ag_2Te) by a topotactic transformation or copper telluride (Cu_7Te_4) by a disproportionation reaction. On the other hand, films of thermoelectric materials were electrodeposited in aqueous media, such as SnSe and SnS .

From a more fundamental perspective, electrochemistry can also be used to break the symmetry by using bipolar electrochemistry. So far, this process was applied to conductive materials. A new challenge is to modify non-conductive substrates such as glass.

Kindly invited.