18 months Post-Doctoral position in Orléans – France on

« Bimetallic nanoparticles behavior under irradiation"

A post-doctoral grant for an experimental physicist in material science is open within the framework of a project dealing with the study of nanoparticle behavior under irradiation.

Subject:
In nanoscience, novel properties are inherent to nanosized systems due to confinement effects and to the reduction in dimensionality. In this field, bimetallic nanostructures represent a large family of systems where both the size and the chemical composition play a significant role in the structure and, as a consequence, in chemical and physical properties. Indeed, bimetallic nanoparticles have received considerable attention because, besides the size reduction effect, the addition of a second metal provides a method to improve and control their properties and functionalities. However, under irradiation some modifications of these nano-objects can occur and consequently can change their initial properties.

The aim of the post-doctoral project is to study the structural transformations of metallic nanoparticles induced by the irradiation (with a plasma or ion beams). The objective is twice: i) to study the defect formation induced by the irradiation, ii) to use these effects in order to modify the nanoparticle structure by migration of species, segregation, nanocrystallization…

The post-doctoral researcher will develop the project through a narrow collaboration between the CRMD (Centre de Recherche sur la Matière Divisée), the GREMI (Groupe de Recherche sur l'Energétique des Milieu Ionisés) and the CEMHTI (Conditions Extrêmes et Matériaux : Haute Température et Irradiation), three laboratories localized in Orléans.

The project will be divided in different steps:
1/ Nanoparticle preparation and irradiation:
The nanoparticle preparation will be realized by means of physical routes such as evaporation under ultra-high vacuum, sputtering methods or preformed particle growth in the gas-phase. The irradiation will be realized with a plasma or ion beams during or after the preparation in a large range of ion energy and flux.
The effect of the irradiation will be compared to temperature effects.
2/ Nanoparticle analysis:
Taking account of the ultimate size of these objects (2-10nm), studying their structural and chemical characteristics will require the use of a combination of well-dedicated techniques: Transmission Electron Microscopy, X-ray methods (x-ray diffraction and small angle x-ray scattering), Rutherford Backscattering Spectroscopy and Positon Annihilation Spectroscopy.

Profile: The candidate must possess strong background in material physics with experience in preparation of nanostructures or thin films by means of physical routes. Extra skills in characterization methods would be greatly appreciated.

Starting period: The position is open from February 2015, for 18 months

Applicants should submit their CV with a publication list, a brief description of past research experience and accomplishments and some references to
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