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Proposition of a Post-doc position on TEM and STEM-EELS/EDX study of magnetic nanostructures

Research topic: Diluted magnetic semiconductors

Research laboratory: Groupe de Physique des Matériaux (GPM), Université de Rouen Normandie, France

Dates: march 2019 for a period of 12 months

Requirements: PhD in Material Science, Solid State Physics

Details :

The MAGMA project is a research project aiming to study magnetic nanostructures for applications with low environmental impact. This project is funded by the French « Ministère de l'Éducation Nationale, de l'Enseignement Supérieur et de la Recherche », the « Région Normandie » and the European Union. Europe invests in Normandy with the European Regional Development Fund (ERDF).

One part of this project is devoted to the investigation of Fe ion implantation effects in silicon carbide with the aim to produce a diluted magnetic semiconductor (DMS) at room temperature. The discovery of DMS has stimulated an intense international research due to their applications in the field of spintronics [1]. Recently we obtained a ferromagnetic behavior in 6H-SiC implanted at low Fe concentration (2 at.%) and annealed at high temperature [2]. Depending on the concentration of the dopant, the ferromagnetism can be mostly due to magnetic impurities either inside the matrix or inside nano-clusters.

In the framework of this project, a post-doc position of 12 months is available at the GPM laboratory for advanced TEM characterization of such nanostructures. The post-doctoral fellow will be in charge of the sample preparation, the Cs-corrected Transmission Electron Microscopy (Jeol ARM) observations and STEM-EELS/EDX analyses to obtain atomic maps of the magnetic dopants inside the semiconducting matrix. The results will be compared to those recently obtained by other advanced characterization techniques such as tomographic atom probe and ^{57}Fe Mössbauer spectroscopy. Therefore, the candidate should have a strong experience in TEM and STEM-EELS/EDX including sample preparation by FIB SEM, with good background in Material Science. During his position, the post-doctoral fellow will be able to benefit from the whole advanced instrumental facilities for sample preparation and TEM analyses of the GPM laboratory in order to reinforce his skills in this field.

[1] T. Dietl, K. Sato, T. Fukushima, et al. Rev/ Mod. Phys. **87**, 1311 (2015).

[2] M.L. Diallo, L. Diallo, A. Fnidiki et al, J. Appl. Phys. **122**, 083905 (2017).

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Closing date for application: February 5th, 2019

