



High spatial resolution quantitative Electron Energy Loss Spectroscopy, Application to the nanotechnologies

The CEA-LETI, MINATEC is looking for a candidate to fill a post-doctoral position in the fields of electron energy-loss spectroscopy in transmission electron microscopy (TEM-EELS) and energy-filtering TEM (EFTEM).

The research project will focus on the characterisation of advanced semiconductor devices (High-K gate stack, dopants...) and, more extensively, materials and structures with nanometers dimensions fabricated within MINATEC laboratories (nano-wires, nano-particles...).

TEM samples from devices, structures or materials will be prepared using a FEI Focused Ion Beam DualBeam with low-kV capabilities or using other techniques available within the Minatec Nanocharacterization Platform if necessary. The applicant will be first involved in the acquisition of electrons energy loss spectrums or filtered images using a high spatial resolution transmission electron microscope with a post column energy filter. This experimental part of the work will be mainly dedicated to the optimisation of the microscope and filter parameters to improve spectrums and images qualities (resolution, signal to noise ratio). Protocols, depending on the analysed sample, will be defined.

The work will then focus on evaluating advanced quantitative analysis methodology for ionization-loss electrons. State of the art techniques to model ELNES will be investigated in the case of bulk materials and ultra thin layers in order to compare with experimental edges and help identifying material phases (CMOS H-K gate stack for example). Multiple linear least squares fitting (MLLS), non-linear least squares fitting (NLLS) and multivariate statistical analysis (MSA) will also be evaluated to process TEM-EELS or EFTEM spectrum images for extracting map compositional and bonding information.

TEM-EELS and EFTEM analysis will be done by means of a FEI TITAN 80-300kV with a Cs probe corrector and a Gatan Tridiem energy filter. The applicant will also be involved in the installation and qualification of the new FEI TITAN "pico" which will be delivered to the Nanocharacterization Platform in mid 2010 (Probe and image Cs corrector, monochromator, XFEG, high resolution Gatan energy filter).

Qualifications: This position requires a Ph.D. received not more than five years prior to the date of application in condensed matter physics or a related field, with a strong background in transmission electron microscopy, electron energy loss spectroscopy and dedicated analysis software. Experience in processes involved in the fabrication of semiconductor-based devices is desirable. The successful candidate should be motivated, safety conscious and have programming skills. Excellent oral and written communication skills in French and English are required. In addition, the applicant must have the ability to work in a team and interact effectively with a broad range of colleagues.

How to Apply:

The interested applicants should send their CV with brief statement of interest in the position, and names of at least 3 references, to:

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