Two post-doctoral positions available

Laboratoire des Matériaux et du Génie Physique, UMR CNRS 5628, INPG-Minatec, Grenoble

The positions are open starting January 2007, for an initial period of one year, which can be extended, in both cases, to one year more.
Applications must include a CV, a list of publications, a short presentation of previous research work (1 page) and a cover letter.

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Growth of high-K oxide films: nanoscale engineering of the structure for K boost

Most of today's electronics applications have been made possible by the technical progress of microelectronics and, mainly, by the reduction of the physical dimensions of elementary transistors combined with a drastic increase in performances. The miniaturization of the devices requires the introduction of new materials. Among them, high-K dielectrics are needed to replace the gate oxide SiO_2 (or oxinitride) in CMOS technology.
The work is focused on:

i) the growth of HfO_2-based films on silicon by metal organic chemical vapor deposition (MOCVD). New additives (solid solutions, dopants) as well as tailoring of the microstructure will be investigated for the enhancement of the dielectric permittivity of the films. Different precursors will be tested in collaboration with Air Liquide. The primary characterization of the films mainly by X-ray reflectometry, X-ray diffraction and infrared spectroscopy (ATR-FTIR) will be carried out by the post-doctoral fellow. He will also interact with a team involved in further detailed characterizations (including electrical characterizations).

ii) the integration in transistors of relaxed dimensions for the evaluation of the materials as gate oxide. For this purpose, base wafers will be provided by ST Microelectronics. The post-doctoral fellow will develop the different technological steps (metal gate deposition, metal and oxide etching…) in the clean room facilities at CIME (Centre Inter-universitaire de Micro-Electronique de Grenoble).

This position lies in the framework of the MEDEA+ FOREMOST project (Integration of Fourty Five nanometer CMOS technology). The post-doctoral fellow will have a multi-disciplinary activity in a very dynamic context including MINATEC and microelectronic industries. He/she will have to interact with several other academic laboratories.

The candidate should have experience in thin films deposition and structural/or electrical characterization. Clean room experience is also welcome.

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Detailed structural characterization of functional oxide heterostructures

The work will be focused on the fine structural characterization of functional oxide heterostructures by transmission electron microscopy (combined with EELS) and X-ray photoelectron spectroscopy. The post-doctoral fellow will also participate to synchrotron experiments (XAS, XPS) at the ESRF (Grenoble) or at Brookhaven National Laboratory (USA). The studies will aim at determining the crystalline structure at local scale, defects, and overall nano/microstructure of the films and interfaces (strain relaxation mechanisms, structural and chemical inhomogeneities, oxygen vacancies, distribution of additives…). Such a detailed characterization will be used to gain a better understanding of the physical properties and to tailor the structure for optimizing these properties.
He/she will be involved in two different projects dealing with dielectric or ferroelectric oxides: i) HfO_2-based oxide films on silicon (MEDEA+ FOREMOST project) and ii) epitaxial multiferroic manganites, such as $YMnO_3$ (European STREP “MaCoMuFi” project - see http://www.macomufi.eu).

The applicant should have a strong experience in TEM. He/she will also have to interact with several PhD students and post-docs and thus demonstrate team-work ability.