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POST-DOCTORAL POSITION
FOR THE STUDY OF SIC POWER MOSFETs
USING TEM-EELS

- within the nMat group at CEMES-CNRS, Toulouse, France
- for a period of 12 months (possibility of renewal for a second year)
- starting september 2010
- position financed by the PICF program MobiSIC (Mobility engineering for SiC devices)
- salary: 2100 € per month

Because of its advantageous physical properties, silicon carbide (SiC) is one of the most promising materials for future high-power, high-frequency, and high-temperature devices. Some of the most important key problems limiting the commercialization of SiC power MOSFETs are a high positive fixed charge in the gate oxide, a low threshold voltage, a low effective inversion-layer electron mobility, and a poor reproducibility of these very important parameters. Recently, it was suggested that all these problems can be associated with carbon-related defects in the oxide and, more important, in the SiC bulk. All defects may already be present in the SiC bulk in high numbers and are significantly increased by processing such as thermal oxidation or ion implantation followed by high-temperature anneals.

In this project, the role of the carbon-related defects will be clarified experimentally. In particular, the concentration and chemical state of carbon on the nanometre scale across the SiO_2/SiC interface will be investigated and will be the basis for the development of a quantitative model for the segregation, diffusion and agglomeration of carbon. The analytical results will be also correlated to electrical characterizations

For this, the equipments and skills in transmission electron microscopy of the nanoMaterials (nMat) group at CEMES will be exploited. Particularly, imaging using energy filtered TEM (EFTEM) and local analysis using STEM-EELS acquisition modes will be implemented. The "TECNAI" FEI microscope is the highest-level microscope installed at CEMES. It is a TEM-FEG fitted with a Cs corrector allowing to obtained images free of delocalization effects with a point resolution of 0.12 nm. Moreover, the microscope is also fitted with an energy-filter "TRIDIEM".

Proficiency in the use of TEM-EELS and TEM sample preparation is required together with a background in semiconductor physics and materials science. This project would suit a candidate with strong experimental and communication skills (reports, papers and oral presentation of the results).

The post-doctoral position is located at CEMES which is a laboratory of the "National Center for Scientific Research" (CNRS) set in Toulouse and will be developed within the nMat group (http://www.cemes.fr/nMat).

The applications should include curriculum vitae and give complete information about the applicant's education, experience and publications (copies of the best papers) together with recommendation letters. Applications are being considered now upon mutual agreement (preferably before july 2010).