O 37 Hauptvortrag Soukiassian

Zeit: Dienstag 09:45–10:30 Raum: TU EB301

Hauptvortrag O 37.1 Di 09:45 TU EB301

Silicon Carbide Surfaces: Metallization versus Passivation — •Patrick Soukiassian — Commissariat à l'Energie Atomique, Laboratoire SIMA associé à l'Université de Paris-Sud/Orsay, DSM-DRECAM-SPCSI, Saclay, Bâtiment 462, 91191 Gif sur Yvette Cedex, France

Silicon carbide (SiC) is an advanced semiconductor especially promising in high power, high temperature, high voltage and high frequency micro-electronics devices and sensors. Cubic and hexagonal SiC surfaces exhibit many reconstructions (over 10). SiC nanochemistry with oxygen and hydrogen is studied by atom-resolved scanning tunneling microscopy and spectroscopy, synchrotron radiation based- core level and valence band photoemission spectroscopies, and infrared absorption spectroscopy. The following results will be presented and discussed: i) Atomic scale understanding of O2 interaction and initial oxide interface formation. ii) The first example of H-induced semiconductor surface metallization. This unprecedented behavior results from H-creating a specific defect coming from competition between hydrogen termination of surface dangling bonds and hydrogen-generated steric hindrance below the surface. In addition, such a H-induced metallization is not removed by oxygen exposures and most interestingly, also takes place on a pre-oxidized SiC surface. This H-induced metallization directly impacts the ability to eliminate electronic defects at semiconductor interfaces critical for microelectronics, provides means to develop electrical contacts on high band-gap chemically passive materials, particularly exciting for interfacing with biological systems where oxygen is unavoidable, and gives control of surfaces for lubrication, e.g. in nanomechanical devices.