

Ana G Silva

Cefitec, Departamento de Física, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, P-2829-516 Caparica, Portugal

acs@fct.unl.pt

TITLE: Towards atomically controlled growth and self-limited processes. in-situ characterization using synchrotron radiation.

ABSTRACT:

Devices fabricated from SiC/Si epitaxial wafers has shown to need surface passivation and insulating coatings which depends on the future applications, in order to provide electrical stability, to reduce reverse-current leakage and to increase breakdown voltage. For solar cell applications – and in Metal-Oxide-Semiconductor (MOS) systems – Al-oxide thin film coatings have some strong followers, not the least due to the recent considerable advances of the Atomic layer deposition (ALD) processes. In this talk it will discussed recent results obtained in atomically controlled, self-limiting procedures for growth of aluminium oxide on SiC-on-Si [1-4]. The SiC/Si was formed by a remote CH₄ plasma interacting with Si surfaces in UHV [1-3]. After growing the SiC/Si system a self-limiting Si-oxide layer was grown on the surface, with a thickness of around 1 nm. On top of this layer it is deposited approximately 1 nm of Al with a Knudsen atomic source and then reacted it thermally with the Si-oxide. All the process steps and the resulting structures of the layers and the interface were monitored, in-situ, using synchrotron radiation induced core level photoemission at ASTRID, Aarhus, Denmark. Results of similar processes with different materials and interfaces will be present and discuss.

Acknowledgements:

A.G.S. has obtained support from EU (CALIPSO 312284) to carry out this project at ASTRID. The technical staffs at ASTRID are thanked for their support and help during the measurements.

References:

- [1] Ana G Silva, Kjeld Pedersen, Zheshen Li, Jeanette Hvam, Rajnish Dhiman and Per Morgen, “Growth of aluminum oxide on silicon carbide with an atomically sharp interface.” J. Vac. Sci. Technology A, 35 (1): 01B142 (1-7) (2017).
- [2] Ana G.-Silva, Kjeld Pedersen, Z. S. Li, and Per Morgen, Photoelectron spectroscopy as an in situ contact-less method for studies of MOS properties of ultra-thin oxides on Si, Applied Surface Science, 353, p. 1208-1213 (2015).
- [3] Rajnish Dhiman and Per Morgen, Growth of thin SiC films on Si single crystal wafers with microwave excited plasma of methane gas, Thin Solid Films, vol: 536, 130-135 (2013).