Open Post-Doc Position at CNRS-LIRMM, Montpellier, FRANCE

Title: Atomistic to Device Modelling of Two-Dimensional Field-Effect Transistors

Description: Vertical stacking of heterogeneous two-dimensional (2D) materials has received considerable attention for nanoelectronics applications. In the semiconductor industry, however, the process of integration for any new material is expensive and complex. Thus, first principles-based models that enable systematic performance evaluation of emerging 2D materials at device and circuit level are of great interest. In this work, the objective is to develop a multi-scale modelling approach, starting from the first principles-based atomistic model to study fundamental electronic properties and charge transfer at the atomic level. Then, from the energy band-structure obtained, the objective is to develop a physics-based compact device model to assess transistor characteristics. Finally, the models are to be implemented in a circuit simulator to facilitate design and simulation of integrated circuits.

Several techniques will be explored such as density functional theory (DFT)-based atomistic model, tight-binding Hamiltonian, Fermi-Dirac (FD) distribution of mobile charge carriers, drift-diffusion (DD) formalism, and piecewise charge linearization (PWCL) technique to capture intricate atomic level phenomena at the circuit level. Ultimately, the objective is to develop device-level models for investigating circuit-level performance and power consumption. The simulation flow from material-to-device will also allow assessing 2D devices for novel applications such as field-effect sensing.

The position will be conducted in the framework of the European H2020 SMARTVISTA (www.smartvista.eu) project in collaboration with several academic and industrial partners.

Qualification: Excellent and self-motivated candidates with a PhD degree in Electrical Engineering, Applied Physics, or Engineering Physics. Experience with QuantumATK and/or other tools in electronic transport simulation.

Start Date: as soon as possible  Duration: 12 Months with possible extension

Location: LIRMM, Bat.4, 161 rue Ada, Montpellier, France

Language: English is mandatory with fluency in both speaking and writing. French is not mandatory.

Application: Online at CNRS Recruitment Website or email Dr. A. Todri-Saniel.

Contact: Dr. Aida Todri-Saniel, CNRS-LIRMM, https://www.lirmm.fr/~todri; Email: todri@lirmm.fr