

Perspectives of transistors based on heterostructures of 2D materials for emerging computing applications

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How close are we to the possibility of engineering next generation transistors atom by atom, as materials science and device engineering converge?

The “materials-on-demand paradigm” based on the 2D materials is a modern evolution of what in the 1980s was called “band-gap engineering” or “band-structure engineering”, i.e., the artificial modification of band edge profiles using heterostructures made possible by epitaxial growth of III-V and II-VI material systems.

Lateral and vertical heterostructures of 2D materials could represent a revolutionary and enabling technology to device engineering providing the possibility to engineer a transistor at the atomistic scale.

In this talk we will discuss the challenges, opportunities, and the performance potential of atomistic engineering of electron devices exploiting the fundamental properties of 2D material heterostructures, with a particular attention to computer architectures for specific applications, such as logic-in-memory and machine learning applications.

Figures

