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Guest editorial

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This Special Issue gives an overview of the field of computational electronics from a European perspective. It is the second of three issues which aim at highlighting the field of computational electronics around the world. The preceding issue edited by Profs. David Ferry and Karl Hess covers the status of the field in the United States, the next issue will present the Asian perspective.

This Special Issue contains 18 invited papers. The first five papers deal with semi-classical transport calculations in Si and SiGe devices, addressing issues of strain engineering, substrate orientation effects, quantum confinement in SOI and multi-gate FETs, and noise modeling.

The five following papers present studies of quantum transport in devices made of conventional semiconductors. The first three papers of this group consider quantum ballistic transport and discuss methods to reduce computation time, including the contact block reduction method, the fast coupled mode space approach, and a dynamic Wigner-Boltzmann approach. The next two papers deal with quantum dissipative transport studies for nano-CMOS devices, with, respectively, methods based on the Wigner-Boltzmann equation and the NEGF method with different approximations for the scattering self energy.

Subsequently, in three papers non-idealities in nano-CMOS transistors leading to statistical variability or enhanced scattering are considered. These include line edge roughness, film thickness variations and interface roughness, and discrete dopant effects, to name a few.

Two papers are devoted to the modeling of optoelectronic devices. The driving applications in this field are photovoltaics, solid-state lighting, communication and sensing.

Electronic devices based on novel materials such as organic semiconductors, carbon nano-tubes, and graphene are the subject of the last three papers.

As the Guest Editors of this Special Issue we would like to thank all authors for their contributions and for sharing their views of the various areas of computational electronics.

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