New semiconductor devices

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Abstract

A review of recently emerging semiconductor devices will be given. For the end of the ITRS roadmap, very innovative materials, technologies and nanodevice architectures will be needed. SOI-based devices seem to be the best candidates for the ultimate integration of ICs on silicon. The flexibility of the SOI structure and the possibility to realize new device architectures allow to obtain optimum electrical properties for low power and high performance circuits. These transistors are also very interesting for high frequency and memory applications. The performance and physical mechanisms will be addressed in single- and multi-gate thin film Si, SiGe and Ge MOSFETs. The impact of tensile or compressive uniaxial and biaxial strains in the channel, of high k materials and metal gates as well as metallic Schottky source-drain architectures will also be discussed. Finally, the interest of advanced beyond-CMOS nanodevices for long term applications, based on nanowires, carbon electronics or small slope switch structures will be presented.

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