

Etude, conception et simulation numérique d'un transistor MOSFET biaxial contraint

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Abstract: Due to the high need for faster electronic devices, with smaller size and higher performances, Researchers and manufacturers of Semiconductor devices make many efforts to face the difficulties and challenges to improve the performances of these semiconductor devices. One of the solutions consists of applying strained silicon on the conventional devices, in such a way that the structure of the MOSFET transistor on a massive substrate known as conventional does not change completely; however, its performances improve. In order to increase the mobility and speed of these electronic devices, Researchers are facing problems related mainly to the reduction in the size of the devices; these problems are known as short channel effects. The aim of this work is to conduct research allowing the study and the computer-aided design of an enhanced architecture of MOSFET transistors called a biaxial transistor using the SILVACO-TCAD process and device simulation software. The results obtained, allowed us then to determine the performances of this device and to compare them to those of the conventional transistor, to show the importance of the introduction of biaxial strain in the improvement of the carrier's mobility and the devices speed, thus allowing obtaining better performances while continuing the scaling.

Keywords : Biaxial, Biaxial strain, High-K material, Mobility, MOSFET, SILVACO-TCAD, simulation, Strained Silicon