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Effects of Focused Gallium Ion-beam Implantation on Properties of
Nanochannels on Silicon-on-insulator Substrates

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Abstract

Gallium dopants have been introduced into micrometer and nanometer sized silicon-on-insulator devices by means of focused ion beam maskless implantation. Structures of implanted devices before and after annealing have been characterized by cross-sectional transmission electron microscopy and Raman spectroscopy. The implanted/annealed micrometer devices exhibit uniformly lower electric resistance due to the presence of dopants; and the nanometer scale devices also show lower resistance but with a large device-to-device fluctuation. The fluctuation is likely to be the result of statistical nonuniformity in the spatial distribution of the end-of-range damage on the nanometer scale.