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Surface Evolution in a Pulsed Laser Induced Epitaxy Process of Submicron SiGe  
Wires

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Abstract

(100) Si substrates are patterned with arrays of Ge wires ~60 nm in width and ~6 nm in thickness. Pulsed laser induced epitaxy (PLIE) is used in an attempt to fabricate ultrasmall dimension Ge<sub>1-x</sub>Si<sub>x</sub> wires. After laser irradiation, interesting changes on the surface are observed. In particular, ripples as high as ~30 nm are formed after the 6 nm Ge wires are incorporated into the substrate. The ripples decrease in height with further laser irradiation. The height is a function of the Ge wire width. Nomarski, scanning electron, atomic force, and cross-sectional transmission electron microscopy are used in the analysis. Possible explanations for the growth of the features are discussed.

Key words : Silicon; Substrates; Germanium; Pattern formation; Nanotechnology;  
Wires; Pulsed laser deposition; Surface reconstruction; Scanning  
electron microscopy; Atomic force microscopy; Transmission  
electron microscopy