Applied Physics Letters
Volume 68, Issue 26, Pages 3734-3736
American Institute of Physics

Formation and Characterization of Ultrasmall Dimension GeSi Wire Structure by Using Pulsed Laser−induced Epitaxy

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Abstract

(100)Si substrates are patterned with arrays of Ge wires 60 nm in width and 6 nm in thickness. Ultrasmall dimension GeSi surface wire structures are then formed in Si in a pulsed laser−induced epitaxy process. The wire structures are analyzed by secondary electron microscopy, atomic force microscopy, Auger electron spectroscopy, and cross−sectional transmission electron microscopy. No defects are observed in the wires structures. However, significant side diffusion of Ge, much more than the vertical diffusion occurred during the 40 ns pulsed laser−induced epitaxy process, is observed in the Si substrate. Surface evolution is also observed. Possible explanations for the abnormal Ge side diffusion are discussed.