

Title: Effects of Pattern Dimensions on Stabilization of Crystal Orientation for (111) Ge-on-Insulator in Rapid Melting Growth

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Abstract: (111)-oriented Ge-on-insulator (GOI) is the key material structure for next generation multifunctional large scale integrated circuits. The (111) GOI structure can be implemented for high-speed transistor channels, as well as templates for the integration of optoelectronic and spintronic materials on the Si platform. The rapid melting growth technique is an effective way to obtain high-quality GOI structures on Si substrates. However, in formation of GOI strips (width: $\sim 3 \mu\text{m}$, thickness: 100 nm) from Si(111) seed, rotation of crystal orientation occurs along $\langle 112 \rangle$ growth direction. In this study, we investigate the effects of GOI pattern-dimensions on orientation stability and demonstrate the suppression of crystal rotation by narrowing the strip width. This enables the formation of (111) GOI strips with any growth direction.