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High Quality of Ge_{1-x} Si_x ($0.9 \leq x \leq 0.95$) Buffers Grown on 6^0 off Si(100) by Using Low Temperature Ge Seed Layer.

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Abstract

High structural quality, really rich germanium (Ge), smooth surface and fully relaxation Ge_{1-x} Si_x ($0.9 \leq x \leq 0.95$) buffers is grown on 6^0 off Si(100) substrate by using ultra high vacuum chemical vapor deposition (UHV-CVD). Low temperature (LT) Ge seed layer was using in order to improve the quality of Ge_{1-x} Si_x buffers. Within this study, the LT-Ge seed layer is deposited directly on Si substrate at a low temperature of 315^0C. After that, stress free $Si_{0.1}Ge_{0.9}$ and $Si_{0.05}Ge_{0.95}$ layer are grown respectively. An in-situ annealing process is also performed for $Si_{0.1}Ge_{0.9}$/ LT-Ge layers to increase the degree of relaxation. The final structure is characterized by atomic force microcopy (AFM), X-ray diffraction (XRD), using reciprocal space maps (RSMs), cross –sectional transmission electron microcopy (XTEM) to determine the buffers thickness, its surface morphology, crystallinity and state of strain.