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Low Temperature Epitaxial Growth of Ge Quantum Dots on Si(100) ALI ER, HANI ELSAYED-ALI, Old Dominion University — The effect of laser-induced electronic excitations on the self-assembly of Ge quantum dots (QD) on Si(100)-(2x1) grown by pulsed laser deposition is studied. The experiment was conducted in ultrahigh vacuum. A chirped pulse amplified Ti:sapphire laser with ∼60 femtosecond pulse width, center wavelength ∼800 nm, and operating at 1 kHz repletion rate was split into two beams; one used to ablate a Ge target while the other to electronically excite the substrate. *In situ* reflection high-energy electron diffraction (RHEED), scanning tunneling microscopy (STM), and *ex situ* atomic force microscopy (AFM) were used to study the morphology of the grown QDs. For Ge coverage of 12 monolayer, it was observed that the excitation laser reduces the epitaxial growth temperature to 70 $^{\circ}$C, at which no epitaxy is possible without excitation. By using nanosecond Nd:YAG laser for ablation and excitation, it was shown that applying the excitation laser to the substrate during the growth changes the QD morphology and island density and improves the size uniformity of the QDs at 390 $^{\circ}$C. RHEED recovery curves show that the excitation laser increases the surface diffusion of the Ge atoms. A purely electronic mechanism of enhanced surface diffusion of the Ge adatoms is involved.

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