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Controlling the self-assembly of Ge quantum dots grown by pulsed laser deposition MOHAMMED HEGAZY, HANI ELSAYED-ALI, Old Dominion University — Growth dynamics and morphology of self-assembled Ge quantum dots (QD) on Si(100)-(2x1) by nanosecond pulsed laser deposition are studied by in situ reflection high-energy electron diffraction (RHEED) and post deposition atomic force microscopy (AFM). The effects of the laser fluence and substrate temperature on the QD formation are investigated. The QD density increased dramatically (from 3×10^7 cm^{-2} to 6.3×10^8 cm^{-2}), while the average lateral size decreased (from 362 nm to 107 nm) when the laser fluence was increased from 23 J/cm^{2}to 70 J/cm^2. Their shape also changed from large huts, observed at 23 J/cm^2, to domes observed at the highest fluence. At 150° C, misaligned QDs formed resulting in diffused RHEED pattern. At 400° C and 500° C, transmission RHEED patterns were observed indicating the growth of oriented hut and dome QDs. Around 600° C, the QDs were formed on top of textured surfaces.

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