Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Ge Quantum Dot Formation on Si (100)-2x1 with Surface Electronic Excitation ALI OGUZER , Old Dominion University — The effect of laser-induced electronic excitations on the self-assembly of Ge quantum dots on Si (100)-2x1 grown by pulsed laser deposition is studied. The samples were first cleaned by using modified Shiraki method and then transferred into the deposition chamber. The vacuum system was then pumped down, baked for at least 12 hours, and the sample was then flashed to 1100 $^{\circ}$C in order for the 2×1 reconstruction to form. The experiment was conducted under a pressure $\sim$1x10^{-10} Torr. A Q-switched Nd:YAG laser (wavelength λ = 1064 nm, 10 Hz repetition rate) was used to ablate a Ge target. In-situ RHEED and STM and ex-situ AFM were used to study the morphology of the grown QD. The dependence of the QD morphology on substrate temperature and ablation and excitation laser energy density was studied. Electronic excitation is shown to affect the surface morphology. Laser irradiation of the Si substrate is shown to decrease the roughness of films grown at a substrate temperature of $\sim$450 ^{o}C. Electronic excitation also affected surface coverage ratio and cluster density and decreased the temperature required to form 3-dimensional quantum dots. Possible mechanisms involved will be discussed.

Hani Elsayed-Ali
Old Dominion University

Date submitted: 16 Dec 2008 Electronic form version 1.4