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Effect of Elastic Inhomogeneity and Anisotropy on the Order of Epitaxial Self-Assembled Quantum Dots CHANDAN KUMAR, LAWRENCE FRIEDMAN, Penn State University — Growth of epitaxial self-assembled semiconductor quantum dots (SAQDs) is of particular interest in the development of quantum dot based devices such as quantum computing architectures, laser diodes, and other optoelectronic devices. The ordering of these SAQDs is critical for the development of these devices. Understanding what factors the order of these SAQDs depend on, is important for guiding both experiments and simulations. Most theoretical and numerical models approximate the film substrate system as a semi-infinite solid. Although models based on such an approximation have been able to predict some general behaviour in confirmation with the experimental results, predictions about a quantitative measure would be less approximate if the models could incorporate elastic inhomogeneity. The presented linear stochastic model for SAQD growth incorporates elastic inhomogeneity and anisotropy along with stochastic surface diffusion to produce a more refined quantitative model for SAQD order estimation. For the Ge/Si film-substrate system it is found that at the critical film height such an approximation could lead to an error of $\sim 12\%$ in the estimation of average spacing between SAQDs and an error of $\sim 24\%$ in the estimation of number of correlated dots for small height fluctuations.

Chandan Kumar
Penn State University

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