# SELF-ASSEMBLY OF QUANTUM DOTS BY THE STRESS FIELD OF INTERFACIAL DISLOCATIONS IN MULTI-LAYER THIN FILMS

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Precise self-assembly of Quantum Dots (QDs) is essential to their utilization in a wide variety of electronic and opto-electronic applications. Self-assembly is governed by three types of competing phenomena: (1) the “natural”self-organization produced by instabilities in reaction-diffusion dynamics (e.g. spinodal decomposition), (2) the anisotropic diffusion of adatoms on the substrate, (3) a “forcing”stress field that influences adatom diffusion in a predictable manner. One approach to achieve the latter phenomenon is by generating a periodic stress field on a Si substrate via interfacial dislocations between the substrate and a thin film. When adatoms are then deposited on the thin film, the stress field generated by the interfacial dislocation array influences their clustering. We present results of solutions to the stress field of interfacial dislocations and buried quantum dots in multi-layers, the influence of the stress field on the activation tensor for adatom diffusion based on the Modified Embedded Atom Method (MEAM), and Kinetic Monte Carlo (KMC) simulations of adatom clustering into self-assembled QDs on stressed multi-layer substrates. Material design parameters for the self-assembly process will be discussed in view of experimental observations.