Epitaxial growth with pulsed deposition: Submonolayer scaling and Villain instability - DTU Orbit (25/07/2018)

It has been observed experimentally that under certain conditions, pulsed laser deposition (PLD) produces smoother surfaces than ordinary molecular beam epitaxy (MBE). So far, the mechanism leading to the improved quality of surfaces in PLD is not yet fully understood. In the present work, we investigate the physical properties of a simple model for PLD, in which the transient mobility of adatoms and diffusion along edges is neglected. Analyzing the crossover from MBE to PLD, the scaling properties of the time-dependent nucleation density as well as the influence of Ehrlich-Schwoebel barriers, we find that there is indeed a range of parameters, where the surface quality in PLD is better than in MBE. However, since the improvement is weak and occurs only in a small range of parameters we conclude that deposition in pulses alone cannot explain the experimentally observed smoothness of PLD-grown surfaces.