Abstract Submitted
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Atom-Scale Mechanisms for Unstable Growth on Patterned GaAs(001)[1] TABASSOM TADAYYON-ESLAMI, HUNG-CHIH KAN, University of Maryland, LYNN CALHOUN, Laboratory for Physical Sciences, RAY PHANEUF, University of Maryland — Molecular beam epitaxy on patterned GaAs(001) under standard conditions of temperature ($\sim$600 $^\circ$C), rate ($\sim$ 0.3 nm/s) and flux ratio (As_2/Ga$\sim$10:1) leads to a transient instability toward perturbation of the flat surface [1]. Lowering the temperature through approximately 540^{o}C, roughly coincident with the preroughening temperature changes the mode of this instability [2]; however, as we show in this talk, observations of the As_2 flux dependence rule out both preroughening and a reconstructive phase transition as driving the growth mode change. Instead, we find evidence that the change in unstable growth mode can be explained by a competition between decreased adatom collection rate on small terraces and a small anisotropic multi-step Ehrlich-Schwoebel barrier. We relate these effects to the up-down symmetry breaking term which commonly appears in continuum equations for growth. [1] H.-C. Kan, S. Shah, T. Tadayyon-Eslami and R.J. Phaneuf, Phys. Rev. Lett., **92**, 146101 (2004). [2] T. Tadayyon-Eslami, H.-C. Kan, L. C. Calhoun and R. J. Phaneuf, Phys. Rev. Lett., **97**, 126101 (2006).

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