

Abstract for an Invited Paper
for the MAR06 Meeting of
The American Physical Society

Physical Origin of Long-Range-Order in Lateral Development of Crystallites: A New Lateral Growth Mode¹

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The basic picture of heteroepitaxial growth can be summarized as formation of islands on a foreign substrate first, followed by horizontal expansion of the islands on the substrate. Previously little attention has been paid to how the interfacial tensions affect the horizontal expansion of a crystalline island over the substrate, which has recently been found to affect the physical property of thin film significantly. For example, tilting of crystallographic orientation has frequently been observed in epitaxial layers, and our understanding of such effect is very limited. Recently Wang and his colleagues studied lateral growth of NH_4Cl crystallite on a foreign substrate mediated by successive nucleation. With state-of-the-art structural and morphological characterization methods, they observed that the crystallographic orientation is consecutively rotated, leading to periodic structures on the surface of crystallite aggregate. They demonstrated that this unusual effect is related to the asymmetric surface/interface tensions in the early stage of nucleation, and should be enlightening for a class of thin film growth where nucleation plays a dominant role. Mu Wang, D.-W. Li, D.-J. Shu, P. Bennema, et.al., Phys. Rev. Lett., **94**, 125505 (2005) D. W. Li, Mu Wang, P. Liu, et.al., J. Phys. Chem. **B107**, 96-101, 2003, X. Y. Liu, Mu Wang, D. W. Li, et al., J. Cryst. Growth **208**, 687-695 (2000) Mu Wang, X.Y. Liu, C. Strom, et al., Phys. Rev. Lett. **80**, 3089 (1998)

¹Project supported by MST and NSF of China