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The growth mechanism of anisotropic organic molecular films A. AL-MAHBOOB, WPI-Advanced Institute for Materials Research, Tohoku University, Y. FUJIKAWA, Institute for Materials Research, Tohoku University, J.T. SADOWSKI, Center for Functional Nanomaterials, Brookhaven National Laboratory, Upton, NY 11973, QIKUN XUE, T. SAKURAI, WPI-Advanced Institute for Materials Research, Tohoku University — The anisotropy in molecular structure and crystal packing may complicate nucleation and growth processes in organic molecular films. The growth mechanism of pentacene (Pn) films has been studied by real time low-energy electron microscopy. Pn is most promising for FET application as it shows the highest field-effect mobility among organic thin-films. We observed delayed nucleation and formation of large grains (as large as 0.5 mm in diameter) on semiconducting $\alpha\sqrt{3}$-Bi-Si(111) and on semi-metallic Bi(0001)/Si(111), with a significant delay in film growth after stopping Pn deposition, indicating long diffusion time. This is in contrast to the growth of Pn on SAMs, oxides or wetting layer on clean silicon surfaces. The long diffusion time could be explained by large barrier for Pn nucleation with standing-up orientation from a lying-down diffusing state due to stronger interaction between lying molecules and Bi-treated substrates.

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