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Morphology of thin organic semiconductor layers on vicinal (0001) sapphire surface GVIDO BRATINA, PRIMOŽ REBERNIK RIBIC, University of Nova Gorica — Morphology of pentacene, 3,4,9,10-perylenetetracarboxylic dianhydride (PTCDA), rubrene, and N,N′-diphenyl-N,N′-bis(3-methylphenyl)-1,1′-diphenyl-4,4′-diamine (TPD) layers grown on vicinal (0001) sapphire surface was examined by non-contact atomic force microscopy ex situ. The layer thickness ranged from a submonolayer coverage to up to four molecular layers. Pentacene was found to nucleate at the nm-size sapphire steps, and continues to grow on the terraces in a layer-plus-island growth mode. PTCDA nucleates randomly at room temperature, while at 135°C and low coverage the molecules aggregate at the steps. At increased coverage the island growth proceeds in the directions determined by the intermolecular interactions and not along the steps. Rubrene and TPD nucleate in 3D islands that evolve over time by ripening. TPD nucleates along the steps and also ripening proceeds along the steps. The rate of ripening of rubrene islands is one order of magnitude slower than the rate of ripening of TPD. We associate this difference to the wealth of rotational degrees of freedom in TPD molecules as opposed to only twisting degree of the tetracene backbone in rubrene.

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