Abstract Submitted
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Temperature Dependent Anisotropic Step-Flow Growth of Metal Phthalocyanine on Silicon Studied by Scanning Probe Microscopy[1] SEAN WAGNER, Department of Physics and Astronomy, Michigan State University, RICHARD LUNT, Department of Chemical Engineering and Materials Science, Michigan State University, PENGPENG ZHANG, Department of Physics and Astronomy, Michigan State University — Control of highly ordered organic molecular thin films is currently of intense interest for integration into modern electronics due to the tunable nature of organic molecules. Here, we study the initial growth of archetypal zinc phthalocyanine (ZnPc) and copper phthalocyanine (CuPc) on the deactivated Si(111) surface. Using scanning probe microscopy (SPM), we demonstrate access to a new quasi-epitaxial anisotropic step-flow growth for both ZnPc and CuPc with a *single* dominant long-range ordered relationship between the organic crystalline film and the substrate, uniquely distinct from inorganic epitaxial step-flow growth. This growth mode is largely attributed to the molecular diffusion and preferential nucleation at step edges enabled by the deactivated Si surface. We demonstrate the transition of growth modes by varying substrate temperature during deposition, altering the balance between diffusion and step- and island- nucleation rates. Access to the anisotropic step-flow growth offers new potential for the integration of highly-ordered organic thin films in silicon-based electronics.

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