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Van der Waals epitaxy of organic crystal films on hexagonal boron nitride layers for high-quality organic electronics CHUL-HO LEE, Department of Physics and Chemistry, Columbia University, New York, New York 10027, United States, THEANNE SCHIROS, Energy Frontier Research Center, Columbia University, New York, New York 10027, United States, SEOK JU KANG, BUMJUNG KIM, Department of Chemistry, Columbia University, New York, New York 10027, United States, KEVIN YAGER, Center for Functional Nanomaterials, Brookhaven National Laboratory, Upton, New York 11973-5000, United States, COLIN NUCKOLLS, Department of Chemistry, Columbia University, New York, New York 10027, United States, PHILIP KIM, Department of Physics, Columbia University, New York, New York 10027, United States — The charge transport in organic field-effect transistors (FETs) is strongly influenced by the dielectric and interface properties because crucial carrier processes including accumulation and transport take place at the interface between dielectric and organic materials. In this sense, hexagonal boron nitride (h-BN), which is a layered van der Waals (vdW) dielectric having atomically flat surface and no surface charge trap states, has great potential for both achieving high-quality organic FETs and investigating the intrinsic carrier transport properties in organic semiconductors. In this talk, we present the direct growth of rubrene crystal films on h-BN layers, demonstrating that there exists vdW epitaxial relation between rubrene and h-BN. Furthermore, charge transport properties in FETs using graphene electrodes will be discussed.

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