Abstract Submitted
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Effect of impurities on pentacene thin film growth for field-effect transistors[1] ELBA GOMAR-NADAL, BRAD R. CONRAD, ELLEN D. WILLIAMS, Physics Department and Materials Research Science and Engineering Center, University of Maryland, College Park, MD 20742 — The presence of impurities in organic semiconductors is one of the factors that limit device performance. Among all organic semiconductors, pentacene has shown the highest mobility reported to date. The effect of a controlled introduction in pentacene thin films of a well characterized impurity, 6,13-pentacenequinone (PnQ), was investigated. Since the majority of charge carriers in organic field effect transistors (OTFT) are located at the semiconductor-dielectric interface, this work focuses on the correlation between pentacene ultrathin film morphology and the overall OTFT device performance. The introduction of large amounts of PnQ revealed the presence of crystalline domains characteristic of pure PnQ submonolayer growth. The change of crystalline structure of the initial submonolayer for smaller amounts of PnQ is being investigated. The transistor mobility is dramatically reduced by increasing the degree of PnQ in the source material.

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Elba Gomar-Nadal
Physics Department and Materials Research Science and
Engineering Center, University of Maryland, College Park, MD 20742

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