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2D Continuum Percolation in Single-Monolayer Pentacene Transistors BYOUNG-NAM PARK, SOONJOO SEO, PAUL EVANS, University of Wisconsin, Madison — Geometrical effects arising from the percolation of monolayer islands have a crucial role in the electrical properties of single-layer-scale pentacene thin films. We fabricated and characterized bottom-contact pentacene monolayer transistors on silicon dioxide substrates. In-situ measurements allowed the electrical properties of the pentacene thin films to be determined as a function of pentacene coverage during the deposition of the first monolayer of pentacene. Current begins to flow between the source and drain electrodes of a pentacene transistor at a sharp threshold where the fraction of the surface covered by molecular islands exceeds approximately 0.7. Van der Pauw sheet resistance measurements with slightly higher coverages eliminate the artifacts associated with contact resistance and reveal a much higher mobility than two-contact FET measurements.

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