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Charge transport mechanisms in phthalocyanine thin films CORNELIU COLESNIUC, AMOS SHARONI, IVAN K. SCHULLER, Department of Physics, University of California San Diego, La Jolla, Ca 92093 — Devices consisting of phthalocyanine thin films sandwiched between gold electrodes were fabricated by organic molecular beam deposition. Samples with different organic layer thickness were deposited on sapphire substrates in-situ, using a shadow mask and a mobile sample holder controlled manually. The structural asymmetry of the devices determined by the different metal-organic interfaces is reflected in the I-V curves at positive and negative voltages. The logarithmic scale I-V plots can be fitted with linear functions of different slopes corresponding to different conduction regimes. At low temperatures a transition from the ohmic regime to a slope two space charge limited conduction mechanism is followed at higher voltages by a high slope linear dependence that tends to saturate when the voltage reaches maximum values. At higher temperatures the intermediary space charge limited regime disappears and the transition is from ohmic to high slope space charge limited. Traps with different energy and energy distribution determine the different conduction regimes. Shallow traps located at discrete energy levels control the transport at intermediate voltages while exponentially distributed traps determine the high voltage behavior. Work supported by AFOSR-MURI.

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