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Charge injection across a metal-organic interface suppressed by thermal diffusion[1] CARLOS MONTON, THOMAS SAERBECK, ILYA VALMIANSKI, IVAN K. SCHULLER, Department of Physics and Center for Advanced Nanoscience, University of California San Diego — Considerable progress has been made in developing metallophthalocyanine devices, although details of the underlying mechanisms in electrical transport are not fully understood. More importantly, few studies have explored their performance at realistic working temperatures, well above room temperature. In this work we explore the performance of Co-phthalocyanine (CoPc) vertical capacitive devices up to 460K. We find that the ohmic conductance is irreversibly suppressed by orders of magnitude when the devices are heated above 340 K. Detailed structural and transport studies imply that the changes in the conductance are due to diffusion of the top Pd electrode into the CoPc layer. This leads to a decrease in Pd electrode work function, which increases the potential barrier for hole injection. These results have a direct impact on technological applications since the instabilities of metallic-organic capacitive devices occur at operational temperatures typical for electronic (350K to 400K).

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