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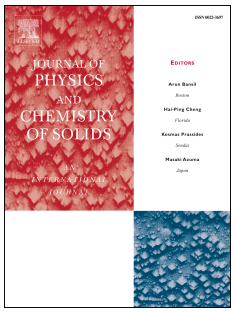

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Optical Absorption and Electrical Properties of MPc (M =Fe, Cu, Zn)-TCNQ Interfaces for Optoelectronic Applications

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ABSTRACT

This research is related to the growth and characterization of doped molecular semiconductor metallophthalocyanine-tetracyanoquinodimethane (MPc-TCNQ) films, with M=Fe, Zn, Cu. FT-IR and Raman spectroscopies were employed to study the chemical interactions taking place in the MPc-TCNQ films. XRD was carried out to determine the crystalline structure present in the samples, due to the facility of the MPcs to be in alpha and/or beta phases. The thin films were analized by SEM and UV-vis spectroscopy in order to study their morphological and optical properties. The absorption spectra recorded in the UV-Vis region for the deposited samples showed two bands, namely the Q and Soret bands. The absorption coefficient (α) and photon energy (*hv*) were calculated from the UV-vis spectra, to in turn determine the optic activation energy in each film and its semiconductor behavior. The values obtained for direct transitions due to the crystallinity of the films were: 1.2, 1.4 and 2 eV for FePc-TCNQ (*MMFe*), ZnPc-TCNQ (*MMZn*) and CuPc-TCNQ (*MMCu*), respectively. Additionally, *I-V* characteristics have been obtained from fabricated glass/ITO/*MM*/Ag devices using ohmic contacts both after annealing. The electrical properties of the devices, e.g. carrier mobility and concentration of thermally generated holes, were extracted from the *J-V* characteristics. The results show that the