

Journal of Applied Physics -- 15 January 2006

J. Appl. Phys. **99**, 023701 (2006) (7 pages)

Full Text: [[HTML](#) [Sectioned HTML](#) [PDF](#) (135 kB)] [Order](#)

Revealing ionic motion molecular solids

[I. Thurzo](#) and [D. R. T. Zahn](#)

Institut für Physik, TU-Chemnitz, D-09107 Chemnitz, Germany

(Received 5 July 2005; accepted 20 November 2005; published online 17 January 2006)

Thin films of mixed valence semiconductor copper-tetracyano-quinodimethane (Cu-TCNQ) and small molecule tris(8-hydroxyquinolinato)aluminum (Alq₃) were investigated by current-voltage (*I-V*) and admittance (*C-V, G-V*) techniques in single-layer configuration with different combinations of electrodes. The predicted hysteresis of *I-V* curves and nearly constant loss (NCL) could be observed for both materials. When cycling devices between negative and positive biases, slowly decaying ionic transient currents interfere with steady-state currents and point to unidirectional motions of the ionic species with subsequent redox reaction at one of the electrodes. Plotting the frequency *f* dependence of the equivalent parallel capacitance at zero bias as $\log_{10} C(0)$ versus $\log_{10}(f)$, the dielectric behavior of Cu-TCNQ and Alq₃ complies with the effective-medium model for NCL in ionic conductors [J. R. Macdonald J. Appl. Phys. **94**, 558 (2003)]. It also holds for a similar plot of the equivalent parallel zero-bias conductance *G*(0). The nature of the revealed mobile ions is discussed with emphasis on their sources. ©2006 American Institute of Physics

[doi:10.1063/1.2158136](#)

PACS: 66.30.Hs, 71.28.+d, 73.61.Ph [Additional Information](#)

View ISI's Web of Science data for this article: [[Source Abstract](#) | [Related Articles](#)]