

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Viewing density of states of the contact in organic thin-film transistors TAKEO MINARI, KAZUHITO TSUKAGOSHI, TETSUHIKO MIYADERA, RIKEN/CREST, HIROMI ITO, RIKEN, YOSHINOBU AOYAGI, RIKEN/CREST, RIKEN/CREST TEAM — The large contact resistance is one of the most critical issues in the research and development of organic thin-film transistors (OTFTs). In this study, we developed a method for evaluating the injection process of OTFTs through the effective use of the gate voltage dependence as energetic spectroscopy of charge injection. In this spectroscopy, quasi-Fermi level tuning in contact by scanning the gate voltage provides essential clues to the determination of the energy state of the contact. Based on the concept that the contact resistance is composed of the resistance of a barrier at metal/organic interface and bulk resistance of organic film itself, we attempted to reduce the interface barrier height by inserting a thin doping layer of charge-transfer molecule (CTM) into the metal/organic interface. A suppression of the interfacial barrier height unveiled energetic distribution of the density of states (DOS) localized at the contact. We also found that the bulk transport clearly obeys the Meyer-Neldel rule, according to which the exponential density of states near the band edge limits the charge injection.

Takeo Minari
RIKEN/CREST

Date submitted: 20 Nov 2006

Electronic form version 1.4