173.Title: Ultrafast IR and THz spectroscopy of photo-induced insulator to metal transition in highly correlated organic system

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Source: JOURNAL OF LUMINESCENCE

Volume:131

Issue:3

Pages: 409-414

Publication year: 2011

Document type:Journal article (JA)

Abstract: Photo-induced insulator to metal transitions (PIMT) in quarter filled layered organic conductors Er [bis(ethylenedithio)tetrathiafulvalene]-based salts alpha(ET)(2)l(3), theta-(ET)(2)RbZn(SCN)(4), and kappa-(d-ET)(2)Cu[N(CN)(2)Br] were investigated using ultrafast spectroscopy in the near, mid-infrared and terahertz (THz) regions. In charge ordered salts alpha-(ET)(2)l(3) and theta-(ET)(2)RbZn(SCN)(4), an immediate (< 30 fs) generation of a microscopic metallic state is driven by the electronic process. Subsequently, condensation of the microscopic metallic domain to the macroscopic scale is accompanied by a small molecular rearrangement in alpha-(ET)(2)l(3). However, in theta-(ET)(2)RbZn(SCN)(4), a large structural difference between the insulator and metallic phases prevents stabilization of the macroscopic metallic state. In a dimer Mott insulator kappa-(d-ET)(2)Cu[N(CN)(2)Br], photo-generation of the metallic state shows a finite rise time of ca. 1 ps, which is attributable to the photo-induced change of on-site Coulomb energy on each dimer (U-dim) through dimeric molecular rearrangement. Thus, the ultrafast dynamics of PIMT depend strongly on the molecular arrangement in the layer of ET salts.