회보
BULLETIN OF THE KOREAN PHYSICAL SOCIETY

2008년 가을 학술논문발표회 및 임시총회

김대중컨벤션센터
2008.10.23(목)~24(금)
Anisotropic Mobility of Organic Semiconductor: tetrathiotetracenafulvalene (TMTSF)  
KIM Ja-Yeon, YUN Mira, LEE Injae (Department of Physics, Research Institute of Physics and Chemistry, Chungbuk National University.)  
We report the studies on anisotropic electrical transport of an organic single crystal semiconductor TMTSF (tetrathiotetracenafulvalene) in the field effect transistor geometry. The single crystal TMTSF was synthesized by physical vapor deposition (PVD). The structure of the synthesized crystals was characterized by using a four circle X-ray diffraction. The stamp-type organic FET device was fabricated using Parylene-C as a gate insulator on an elastomeric substrate Polydimethylsiloxane (PDMS). The extra flexible stamp-type device helps to make an intimate contact between the contact pads and the semiconducting organic single crystal TMTSF. Also, it minimizes stress exerted on the organic single crystal while warranting reversible use of the device. Anisotropic mobility of the free standing film type single crystal TMTSF semiconductor was measured in various crystal axes relative to the direction of the source-drain electrode. The maximum field effect mobility was obtained as 3.96 cm²/Vs (saturation region) which is an order of magnitude higher than the value reported previously on single crystal TMTSF.

Photo-controlled Trapped Electron Density and Memory Effect in Soluble Organic Thin Film Transistors  
JO Mi-an, KIM Si-woo, KIM In-soo, CHUNG Ji-seung, PARK Ji-kyu, KIM Min-joo, LEE Sung-kwan, LEE Jong-seung (Department of Chemistry, Seoul National University.)  
We investigated the photo-controlled trapped electron memory effect in soluble organic thin film transistors (OTFTs) with a CBP-PCBM active layer, and examined the memory effect dynamics. OTFTs were fabricated using the following material structures: ITO/Ca(15nm)/PCBM:CBP(50nm)/CBP:PCBM(15nm)/SiO2(20nm)/Si (100nm). The photocontrolled trapped electron density and memory effect were observed at room temperature. The trapped electron density could be controlled by the number of gate voltage cycles. The on/off ratio was 10^5, and the OFF current was as low as 10^-10 A. The memory effect was observed for more than 100 cycles without significant changes in the electrical characteristics. The on/off ratio was 10^5, and the OFF current was as low as 10^-10 A.

Site-selective laser-excitation spectroscopy of Eu³⁺ ions doped in K₂YP₃ crystals  
Jang Sung-choi, Ham Seung-woo, Kim Hee-jung, Kim Jong-hee, Lee Young-soo (Department of Physics, Chungbuk National University.)  
We report the site-selective laser-excitation spectroscopy of Eu³⁺ ions doped in K₂YP₃ crystals. The Eu³⁺ ions in K₂YP₃ crystals exhibit a broad absorption bands at around 520 nm, which is attributed to the ¹D₂→¹F₁ transition. By using the site-selective laser-excitation spectroscopy, we could selectively excite the Eu³⁺ ions at specific sites within the crystal. The excitation spectra of the Eu³⁺ ions at different sites within the crystal were obtained by monitoring the luminescence emission at 612 nm. The excitation spectra showed a broad absorption band at around 520 nm, which is attributed to the ¹D₂→¹F₁ transition. By using the site-selective laser-excitation spectroscopy, we could selectively excite the Eu³⁺ ions at specific sites within the crystal. The excitation spectra of the Eu³⁺ ions at different sites within the crystal were obtained by monitoring the luminescence emission at 612 nm. The excitation spectra showed a broad absorption band at around 520 nm, which is attributed to the ¹D₂→¹F₁ transition.