# Effects of F4TCNQ doping on diketopyrrolopyrrole-based, low crystalline, high mobility polymeric semiconductor

윤성원, 하재언, 정대성†
중앙대학교
(dchung@cau.ac.kr†)

The effects of 2,3,5,6-Tetrafluoro-7,7,8,8-tetracyanoquinodimethane (F4TCNQ) doping on diketopyrrolo-pyrrole-based polymeric semiconductors in terms of charge transport behavior and structural ordering are systematically investigated. Ultraviolet photoelectron spectroscopy analyses revealed that a low doping ratio of 1 wt% is sufficient to tune the energy distance between the Fermi level and the HOMO level, reaching saturation at roughly 5 wt%. Structural analyses using grazing-incidence X-ray diffraction (GIXD) show that the overall degree of edge-on orientation is disturbed by the addition of dopants, with significant influence appearing at high doping ratios (>3 wt%). The calculated charge carrier mobility from accumulation mode measurements of FETs showed a maximum value of 2 $cm^2/V{\cdot}s$ at the optimized doping ratio of 1 wt%, enabled by additional holes in the channel region, which results in a roughly 40% increase relative to the undoped device. This result suggests that the electrochemical doping method can be also applied to novel donor-acceptor copolymers to further enhance their charge transport characteristics.