

Laser-induced orientation transformation of a conjugated polymer thin film with enhanced vertical charge transport

채상민, 이아라, 이현휘¹, 최지연², 김효정[†]
부산대학교; ¹포항공과대학교; ²한국기계연구원
(hyojkim@pusan.ac.kr[†])

Here, we report structural transformation and electrical characterization of a poly(3-hexylthiophene) (P3HT) semiconductor thin film under femtosecond laser irradiation at a level below the ablation threshold. A combination of grazing incidence X-ray diffraction and near edge X-ray absorption fine structure analyses reveal that the laser procedure effectively switches the P3HT orientation from edge-on to face-on, and the stability of this face-on orientation was also confirmed. Various laser fluence levels ranging up to the ablation threshold were tested, and the P3HT film with a transformed face-on orientation resulting from the optimized fluence level showed a charge current in the vertical direction three times greater than did the pristine film. These results also confirmed the effectiveness of our novel method for modifying organic thin films, and we expect this method to be attractive for the development of organic electronics and hybrid device applications.