

Research on crystal properties by controlling the deposition temperature of organic semiconductors

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We found a new way to improve the charge transfer characteristics of 6,13-Bis(triisopropylsilylthiynyl) pentacene (TIPS) field effect transistor (FET) devices by embedding bio-friendly plastic nanoparticles of cellulose nano whisker (CNW) into TIPS. In addition, the crystal structure could be controlled according to the deposition temperature of organic semiconductors, and through this analysis, the factors affecting the stability and performance of the device could be analyzed. TIPS-CNW layer and pure TIPS layer were compared using TEM, SEM, and X-ray analysis. The effect of crystal alignment was observed to analyze the cause of increased charge transfer in TIPS-CNW compared to TIPS FET devices. Despite the electrical insulation of the embedded CNW, the incorporation of CNW nanoparticles changed the molecular orientation, size, and crystallinity of the substrate surface and led to improved charge transfer characteristics of TIPS organic semiconductor devices. The characteristics of organic devices were analyzed through electrical measurements such as I-V, C-V, and C-F.

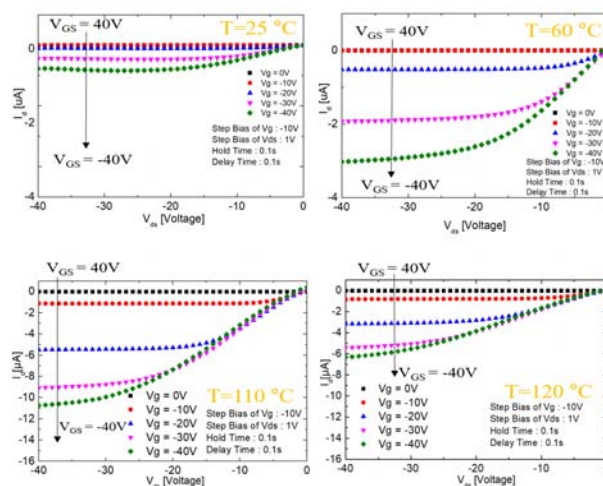


Fig 1. Typical I_{ds} - V_{ds} characteristics of OFET