Enhanced sensitivity of a gas sensor incorporating Morphology-driven high mobility transistor

유성훈, 정대성†, 김경환, 강민균, 장민수
중앙대학교

In this work, cohesive energies of polymer semiconductors were tuned by strategically inserting buffer layers, which resulted in dramatically different semiconductor surface morphologies. Elucidating morphological and structural properties of polymer semiconductor films in conjunction with FET studies revealed that surface morphologies containing large two-dimensional crystalline domains were optimal for achieving high surface areas and creating percolation pathways for charge carriers. Ammonia molecules with electron lone pairs adsorbed on the surface of conjugated semiconductors can serve as efficient trapping centers, which negatively shift transfer curves for p-type PFETs. Therefore, morphology optimization of polymer semiconductors enhances their gas sensing abilities towards ammonia, leading to a facile method of manufacturing high-performance gas sensors.