

Novel Design of Amine-Functionalized Semiconducting Polymer Gel for Highly Sensitive and Selective NO₂ Sensor

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Organic semiconductors-based gas sensors have been remarkable due to secondary interaction with analytes at room temperature. However, that advantage is double-edge sword in that cross-selectivity of various gases. Molecular modification enabling to introduce specific moiety can reduce the cross-selectivity, but the method degrades the intermolecular arrangement related to mobility. Also, organic semiconductors have slow recovery due to their porous structure. Thus, we designed Semiconducting Polymer Gel (SPG) composed of a *semi*-Interpenetrating Polymer Networks (*semi*-IPNs). The functional groups can be introduced through silanol groups which are present in *semi*-IPNs without the degradation of intermolecular arrangement. We utilized amine groups (electron-donating) as a functional group because of their strong interaction with NO₂ (electron-withdrawing). The amine-functionalized SPG (NH₂-SPG) showed higher sensitivity, and selectivity toward various gases. Recovery is also improved due to the suppressed gas penetration by amine groups on the surface.