

High-performance acetone gas sensor using soft-lithographically patterned In-doped ZnO quantum dots

백승은, 강달영[†]
연세대학교

(dykhang@yonsei.ac.kr[†])

High response, sensitivity chemo-resistive sensor based on metal oxide semiconductor has been demonstrated in this work. We have synthesized In-doped ZnO quantum dots (IZO QDs) by hydrothermal method. To increase the surface area of the IZO QDs layer, the layer has been transfer-molded using soft elastomeric stamp. To further increase the surface area of the IZO QD layer to sensing gas molecules, ZnO nanorods (NRs) have been grown on the surface of the patterned IZO QD layer. Compared to flat, drop-cast IZO QD devices, the patterned devices have shown much enhanced sensing performance, such as response, sensitivity and response time. Further, the growth of ZnO NRs on the patterned IZO QD layer have shown much more improved sensing performance than that of simple patterned one. Interestingly, short growing time (0.5 hr) sample has shown the best performance, while rather long time (4 hrs) growing has led to much deteriorated performance to the simple patterned device. The origin of such performance improvement has been discussed based on various analytic results, such as X-ray photoelectron spectroscopy (XPS), X-ray diffraction (XRD), UV-vis spectroscopy (UV-Vis), etc.