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## Room temperature adsorption of ammonia gas on zinc oxide and zinc oxide-carbon nanostructures hybrid

Thursday, 11 July 2019 15:00 (2 hours)

The adsorption and desorption properties of ammonia gas on wurzite Zinc Oxide nanorods (ZnO NRs) and Zinc oxide-Carbon nanostructures (ZnO-CNs) hybrid were studied by fast acquisition x-ray photoemission spectroscopy (XPS). Chemiresistor sensors were made out of the ZnO NRs and ZnO-CNs hybrid and the sensors were exposed to ammonia gas at various concentrations. Ammonia gas was found to chemisorb on the hybrid structure by forming amine groups while on the NRs it first physisorbed on the NRs surface and then dissociates by dehydrogenation to form chemisorbed decomposition NH<sub>x</sub> species. However, the chemisorption was beam induced. The hybrid showed a ~ 4.5 higher sensitivity to ammonia as compared to the ZnO NRs sensor but a slower recovery time. The enhanced response and slow desorption of the ZnO-CNs hybrid can be attributed to the strong interaction of the hybrid with ammonia gas, i.e. the different adsorption surface chemistry of C (chemisorption) and ZnO (physisorption), and also to the increased surface to volume ratio of the CNDs.

Apply to be considered for a student award (Yes / No)?

No

Level for award (Hons, MSc, PhD, N/A)?

N/A

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