562b Effect of Acidity on the Sensitivity and Selectivity of Titanium Oxide Gas Sensor for Hydrocarbon and Hydrogen

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The sensitivity and selectivity of TiO2 gas sensor are found to be affected by the presence of acid species. Two methods were applied to modify the metal oxide: One method is to treat TiO2 with HCl or H2SO4 of different concentration; the other method is to dope TiO2 with different amount of acidic metal oxide, such as ZrO2. H2, C2H4, and C3H8 were selected as probing gases to characterize the sensing properties of the gas sensors. It was found that both the sensor treated by acid and the sensor doped with ZrO2 had a higher sensitivity to hydrocarbon, but the sensitivity of H2 almost kept the same. This method would make it possible to detect hydrocarbon selectively in the presence of hydrogen. BET, XRD, XPS and TPD have been used to characterize sensitivity and possible sensing mechanism of hydrocarbons and hydrogen on TiO2 gas sensors modified by acids.