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A Fast Chemiresistive H₂ Gas Sensor Based on Sputter Grown Nanocrystalline P-TiO₂ Thin Film Decorated with Catalytic Pd-Pt Layer on P-Si Substrate

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Abstract : In the present work, we have fabricated and studied a resistive H_2 gas sensor based on Pd-Pt decorated room temperature sputter grown nanocrystalline porous titanium dioxide (p-TiO₂) thin film on porous silicon (p-Si) substrate for fast H_2 detection. The gas sensing performance of Pd-Pt/p-TiO₂/p-Si sensing electrode towards H_2 gas under low (10-500 ppm) detection limit and operating temperature regime (25-200 °C) was discussed. The sensor is highly sensitive even at room temperature, with response (Ra/Rg) reaching ~102 for 500 ppm H_2 in dry air and its capability of sensing H_2 concentrations as low as ~10 ppm was demonstrated. At elevated temperature of 200 °C, the response reached more than ~103 for 500 ppm H_2 . Overall the fabricated resistive gas sensor exhibited high selectivity, good sensing response, and fast response/recovery time with good stability towards H_2 .

Keywords: sputtering, porous silicon (p-Si), TiO2 thin film, hydrogen gas sensor

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