

Silicon Substrates for Nanoparticle Gas Sensors with Embedded Electrodes and Planar Surface

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Abstract. Standard ceramic substrates with patterned surface electrodes few hundred nm thick are not appropriate for advanced nanoparticle gas sensors. Smooth silicon planar substrates with embedded metallic electrodes are introduced in our work. They give the chance to cover the small substrate surface irregularities by fragile nanoparticle arrays and provide an opportunity to integrate sensors into electronic circuits. The suppression of high power consumption of integrated sensor heater due to the high thermal conductivity of Si is resolved using substrates hanging on thin contacting wires without getting in touch with the socket. Embedded Au electrodes were created in sputtered amorphous silicon layer by lift-off technique. The ridges at Au – a:Si interface were reduced due to improved Au wettability of a:Si vertical walls. γ -Fe₂O₃ nanoparticle deposits on the Si patterned substrates were studied.