Stability of FET - Based hydrogen sensors at high temperatures

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Abstract	A new type of hydrogen sensor based on a Floating Gate Field Effect Transistor (FG - FET) [1] with a n - octadecyltrichlorsilane (ODTS) modified platinum layer of 20 nm in thickness as a gas sensitive layer is presented. The modifications stabilize the sensor signal even at temperatures up to 125 degrees C. The surface of polycrystaline platinum is well known to act as sensitive layer for hydrogen detection in a FG - FET at room temperature [2]. In the presence of hydrogen containing air the work function of a platinum surface is reduced up to 0.5 eV by the adsorption of atomic hydrogen [3]. Unfortunately at temperatures above 60 degrees C a high coverage of atomic oxygen occurs at the platinum surface [4]. This raises the work function again, immediately after the hydrogen exposure so that the hydrogen concentration is no longer exactly detectable. With the deposition of a thin layer of ODTS, we were able to modify the platinum surface preventing it from being covered by oxygen during hydrogen exposure. A detailed model of the reactions at the platinum surface, which leads to the shift in work function, is given. Changes of the reaction paths by the modification are explained.
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