## Abstract Submitted for the APR10 Meeting of The American Physical Society

A study on the interaction between hydrogen and  $Pd/SiO_2/Si^1$ M. ZHAO, S. NAGATA, T. SHIKAMA, IMR, Tohoku University, 2-1-1 Katahira, Sendai 980-8577, Japan, A. INOUYE, S. YAMAMOTO, M. YOSHIKAWA, JAEA. 1233 Watanuki, Takasaki, Gunma 370-1292, Japan, SHIKAMA LAB. TEAM, ADVANCED CERAMIC GROUP TEAM — The surface electrical resistance of  $Pd/SiO_2/Si$  and  $Pd/Al_2O_3$  were monitored by a two-probe technique during the  $H_2$ exposure to clarify the interaction of  $H_2$  and ultra thin Pd film(<2nm). In this work, the  $Pd/SiO_2/Si$  structure has a sensitivity of 30 to 1% H<sub>2</sub>/Ar presence within 1.4 s at RT, where the sensitivity was defined as the ratio of the surface resistance change to the original resistance,  $(R - R_0)/R_0$ . However, the sensitivity of ultra thin Pd film observed in  $Pd/Al_2O_3$  was less than 2. Compared to  $Pd/Al_2O_3$ , the non-linear relationship of I - V of Pd/SiO<sub>2</sub>/Si reveals a possible Schottky barrier and that electrons actually go through the Si substrate. When the thickness of Pd film in  $Pd/SiO_2/Si$  is decreased to less than 2 nm, Si substrate will demonstrate a large change of the charge concentration during the interaction between the Pd film and H<sub>2</sub>. This change amplified displays the change of the work function of Pd films and together with an already accelerated response due to a thinner Pd film, Pd/SiO<sub>2</sub>/Si provides an excellent  $H_2$  detecting capability.

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