Uniform fabrication of Pd-doped Tin Oxide Nano-array in large scale for high performing Hydrogen sensor

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Various metal-oxide gas sensors used in a number of applications for safety and energy efficiency have been studied along explosive, harmful gases. Especially, with the properties of H_2 gas that are colorless and odorless, it is important to detect low level of H_2 gas. Structural modification, noble-metal decoration, heterojunctions have been proved to be effective methods for improving performance in detecting low level of H2 gases. This study is focused on grain size control of noble metal, surface modification and simplification of process. In detail, grain size control of noble metal (< 5nm) is controlled from Secondary Sputtering Lithography via Ar ion bombardment. It is expected to get larger surface area for gas adsorption/desorption and maximizing catalytic, spill-over effect. Along the surface modification with high aspect-ratio side wall, performance of gas sensing could be improved through larger surface area. Also, overall process is simplified and additional noble metal oxidation could be prevented with metal oxide sputtering process. Using this method, shortest response time, higher selectivity and sensitivity to low level of H2, simplification of process are achieved.