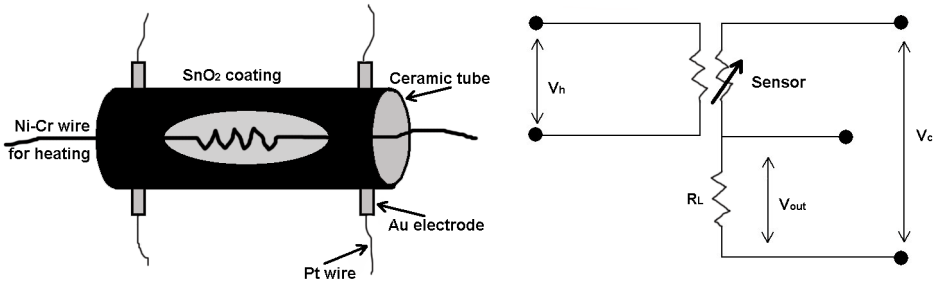
Fabrication of Gas-Sensor:

The procedure for the fabrication of a typical SnO_2-based gas sensor is shown in Scheme 1. The as-prepared SnO_2 powder was mixed with little deionized water to form a paste. The paste was directly coated on the ceramic tube with a pair of Pt wires covered on Au electrodes, then dried in air. After that, the electrodes were jointed on a basement and a Ni-Cr heating wire was inserted into the ceramic tube. Finally, the as-prepared gas sensors were kept at 300 °C for 10h in order to improve their stability. The working temperature can be controlled by adjusting the heating voltage (V_h) of the sensor. The gas-sensor performance was obtained from the V_{out} value of R_L that cascades Rs (the resistance of gas-sensor). Concretely, the Rs can be calculated by the following equation: $Rs= R_L (V_c - V_{out})/V_{out}$. In our experiment, the V_c=5 V and R_L =1 MΩ. The sensor response was defined as $S=R_a/R_g$, where R_a is the resistance in air and R_g is that in the air mixed with detected gases. In addition, the response time was defined as the time required for the conductance to reach 90% of the equilibrium value after a test gas was injected, and the recovery time was the time necessary for a sensor to attain a conductance 10% above its original value in air.



Scheme1. Schematic illustration of fabrication of the gas sensor using SnO_2 particles as sensing material.