# Ultra-sensitive Core-shell Nanowire Metal Oxide Skin Gas Sensor

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As the aging of population progresses in many countries of the world, preparing sufficient supply of health care devices and services as well as curbing the expense of social welfare are raised as social issues. Under this background, medical examination using gas sensors have the advantages over other detection methods, and is gaining attention as new diagnostic technology.

The human body emits hundreds of volatile organic compounds (VOCs) offering a unique insight into biochemical processes ongoing in the healthy and diseased human organism. For example, over the last years, a robust correlation has been established between profiles of breath volatiles and lung cancer, oxidative stress, or organ rejection after transplantation. Thus, the VOC pattern directly relates to the physiological status of an individual. Thus, the high-performance gas sensor is a promising way to realize extremely early state, non-invasive and continuous monitor system.

The concentration of most human expiration and skin respiration gases are around several ppb/min. However, the commercially available gas sensors are ppm-level. It’s hard to use these commercial gas sensors to monitor human health conditions.

Intending to improve the performance of the metal oxide gas sensors., one of the most essential methods is the reduction of particle sizes to nanoscale in the sensing layer. As the particle size is reduced, a higher specific surface area is obtained resulting in a large number of active sites which are beneficial for gas adsorption and consequently for higher sensitivity. In this work, size-controlled nanowire will be studied. Also, how noble metal doping and heterojunction enhance sensitivity will be studied too.

Metal oxide gas sensors share the same defect, which is poor selectivity. In this work, zeolite will combinate with metal oxide gas sensor to enhance the sensitivity.