

## Highly sensitive and reliable GaN based hydrogen sensor in humid ambient using nano-porous membrane

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In recent years, there is great interest in hydrogen as an alternative energy source and a viable energy carrier. Commonly, electrochemical cells are used to transport hydrogen-generated energy to power vehicles and electric devices. Hydrogen gas is extremely reactive with oxygen, and has low ignition energy. This induce spontaneous flammable ignition, posing great risk to humans and commercial equipment. Thus, hydrogen gas detection is a critical issue for hydrogen-related industrial processes and product use. Especially for hydrogen sensors in hydrogen fuel cell vehicle, proper monitoring of the feed stream is very important to ensure an efficient energy conversion. In this environment, detection of hydrogen in highly humid ambient is critical issue. In this work, a highly sensitive GaN based hydrogen sensor which operates reliably in humid ambience using nano-porous membrane was developed. The device showed the  $2.6 \times 10^5\%$  sensitivity for 500 ppm hydrogen even in 100% relative humidity. The nano-porous membrane coated on the sensor effectively permit the hydrogen target gas while blocking water molecules which were tend to cover the active sites of the sensor.