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Research Interests

Our research interests are synthesis of inorganic membranes, fabrications of chemical sensors applied in gas sensing and pH sensing, preparation and applications of nanoparticles, solar utilization of hydrogen generation, etc.

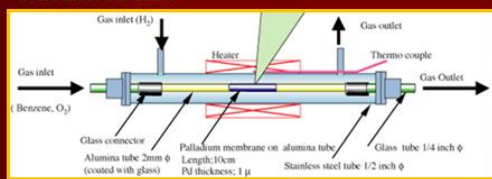
Representative Publications

1. Huey-Ing Chen, Chin-Yi Chu, and Ting-Chia Huang, "Comprehensive Characterization and Permeation Analysis of Thin Pd/Al₂O₃ Composite Membranes Prepared by Suction-assisted Electroless Deposition", *Sep. Sci. Technol.* 39, 1461-1483 (2004).
2. Yen-I Chou, Chia-Ming Chen, Wen-Chau

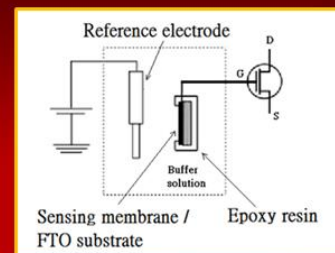
Liu, and Huey-Ing Chen, "A New Pd/InP Schottky Hydrogen Sensor Fabricated by Electrophoretic Deposition with Pd Nanoparticles", *IEEE Electron Dev. Lett.* 26 (2), 62-65 (2005).

3. Chi-Shiang Hsu, Huey-Ing Chen, Po-Cheng Chou, Jian-Kai Liou, Chun-Chia Chen, Chung-Fu Chang, and Wen-Chau Liu, "Hydrogen Sensing Properties of a Pd/AlGaIn/GaN Based Field-Effect Transistor (FET) Under a Nitrogen Ambience," *IEEE Sens. Journal*, 13, 1787-1793 (2013).

Synthesis and Application of Inorganic Membranes



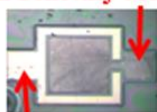
Applications of inorganic thin film on pH sensor



Inorganic Membranes Lab.

Fabrication of Hydrogen Sensors

Pd Schottky contact

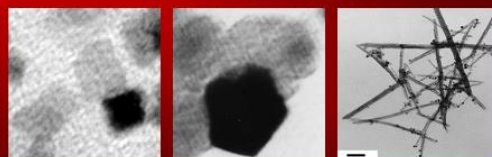


AuGe Ohmic contact



Hydrogen sensor

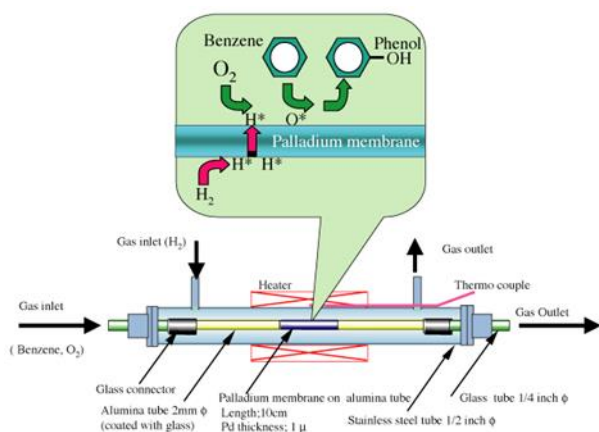
Preparation and Application of Nanoparticles



Different shapes of CeO₂ nanoparticles

Synthesis and Application of Inorganic Membranes

Various inorganic Membranes including alumina, titania and Pd-based composite membranes have been developed for uses on gas separation, purification and membrane reactor.

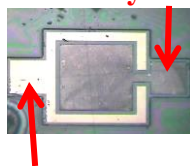


Pd-based membrane reactor used in the production of phenol from benzene.

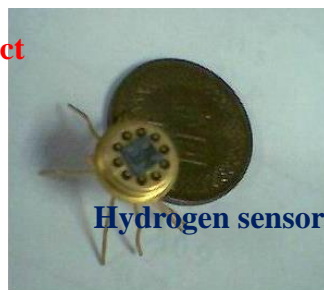
Fabrication of Hydrogen Sensors

Techniques have been employed to develop hydrogen sensors based on Schottky diode and resistivity. Key merits of our deposition techniques are low temperature and low energy. The resulting devices exhibit excellent hydrogen sensing performances with high sensitivity, wide detection range, and rapid response. Multi-functional gas sensors are currently developed in this laboratory.

Pd Schottky contact

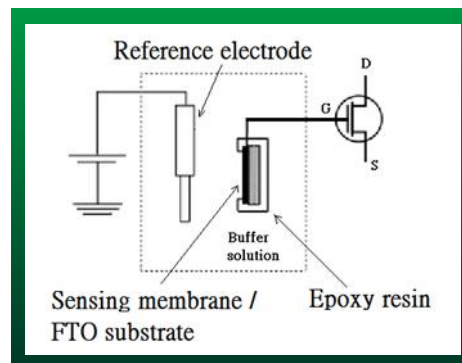


AuGe Ohmic contact



Applications of inorganic thin film on pH sensor

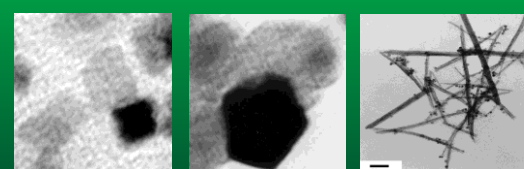
Thin film of metal oxide such as TiO₂, NiO can be used as the sensing membrane of extended gate field-effect transistor pH sensor (EGFET pH sensor). This kind of pH sensors has many advantages like high sensitivity, great linearity, quick response, and long-term stability.



Schematic of EGFET pH sensor.

Preparation and Application of Nanoparticles

Various kinds of nanoparticles have been developed in this laboratory such as metal (Cu, Ni, Pd, Ag, Pd/Ag), metal oxides (TiO₂, CeO₂), and semiconductors (CdSe, CdTe). The preparation, characterization, and application of the nanoparticles are investigated.



Different shapes of CeO₂ nanoparticles