



Hung-Shan Weng (翁鴻山教授)

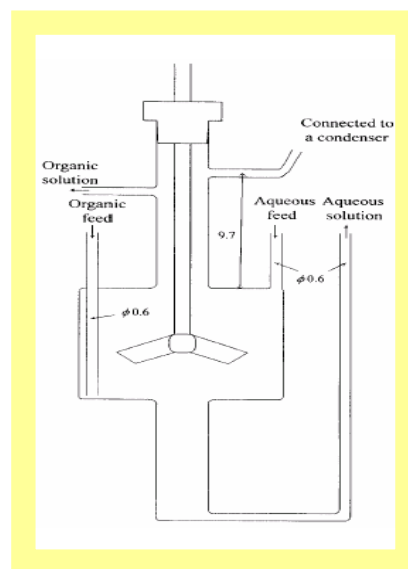
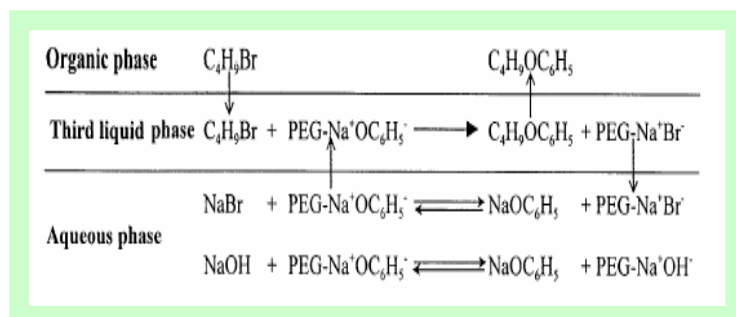
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## Research Interests:

### 1. Phase Transfer Catalysis

--- the conditions for forming a third liquid phase; techniques for reusing the catalysts via the reuse the third liquid phase; optimal operating conditions for synthesizing fine chemicals by tri-liquid-phase catalysis and catalyzed by the catalyst-rich liquid phase.



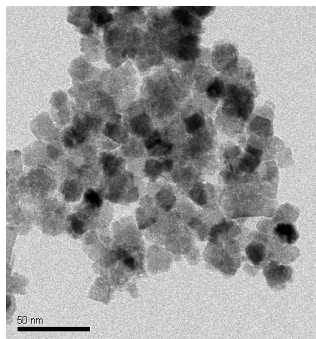
### 2. Abatement of Air Pollutants by Nanocatalysts

--- searching for a high performance supported metal-oxide catalyst for the separate and simultaneous catalytic reduction of sulfur dioxide and nitric oxide.

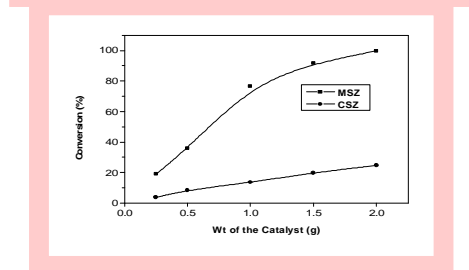
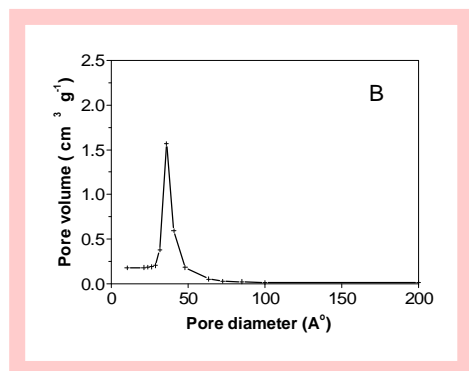
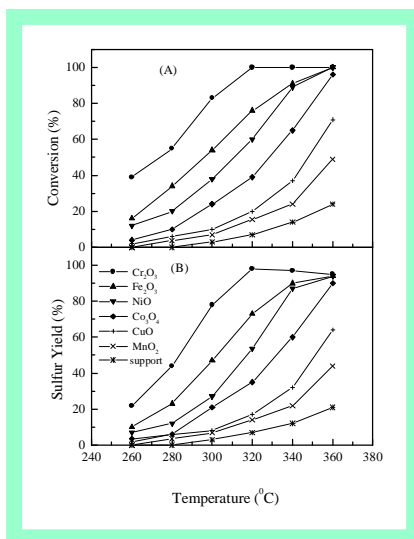


[ Reducing agent :  $H_2, CO, CH_4, C_2H_4$  ]

We can find an optimal condition for forming the third liquid phase in which almost all catalyst resides, so the catalyst in the third liquid phase can be used repeatedly. In addition, because the density of this phase is in between those of the organic and aqueous phases, when the tri-liquid phase catalysis is carried out in a continuous-flow tank reactor, the third liquid phase will not flow out from the reactor, and the catalyst can be used continuously.



This TEM graph shows the sizes of Cr<sub>2</sub>O<sub>3</sub>/CeO<sub>2</sub> catalyst particles are about 30 nm. This catalyst has a very high activity and selectivity.



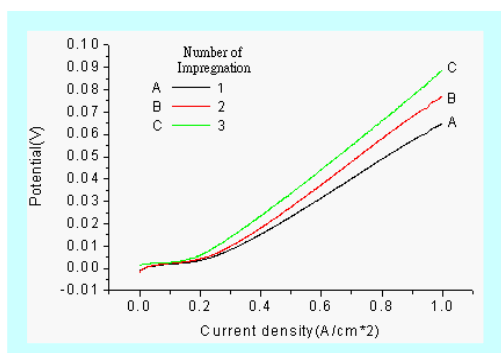
The mesoporous sulfated zirconia we prepared has a far higher activity than the commercial one.

### 3. Mesoporous Sulfated Zirconia

--- finding a suitable method for preparing the catalyst and its application to esterification, alkylation and isomerization.

### 4. Catalysts for Direct Methanol Fuel Cell

--- improving the performance of the catalyst layer by searching for a suitable preparation method and finding a proper carbon support.



Our experimental results reveal that in the preparation of electrocatalysts, the multiple impregnation gives a higher activity than the single one with the same amount of Pt-Ru loaded because of a better metal dispersion.

### 5. Photocatalysis

--- searching for the high activity catalysts and designing reactors for water splitting and mitigation of carbon dioxide with water and hydrogen as reducing agents.

photocatalysts



### Selected Publications

- Hsu-Chin Hsiao and Hung-Shan Weng, Analysis of Factors Affecting the Synthesis of Allyl Phenyl Ether by Tri-liquid-Phase Catalysis, Chem. Eng. Commun.,191(2004), pp. 705-717.
- Hsu-Chin Hsiao, Wei-Chi Li and Hung-Shan Weng, A Preliminary Evaluation of a Continuous-Flow Reactor for Liquid-Liquid-Solid Phase-Transfer Catalyzed Synthesis of n-Butyl Phenyl Ether, J. Chem. Technol. Biotech., 80(2005), pp.299-306.
- Ching-Huei Wang, Chun-Liang Chen, Hung-Shan Weng, Surface Properties and Catalytic Performance of La<sub>1-x</sub>Sr<sub>x</sub>FeO<sub>3</sub> Perovskite-Type Oxides for Methane Combustion, Chemosphere, 57(2004), pp. 1131-1138.
- Chun-Liang Chen and Hung-Shan Weng, Nanosized CeO<sub>2</sub> Supported Metal-Oxide Catalysts for Catalytic Reduction of SO<sub>2</sub> with CO as a Reducing Agent, Appl. Catal. B, 55(2005), pp. 115-122.