Prof. Bing-Hung CHEN

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Research Interests

Dr. Chen earned his PhD in Chemical Engineering at Rice University (1998) with an emphasis in interfacial phenomena. Specifically, Dr. Chen worked in the solubilization process of triglycerides in micelles and microemulsion of surfactants, and the phase behaviors of surfactant mixtures. Dr. Chen also studied the critical phenomena of the colloid-polymer system for his postdoctoral research. Dr. Chen now works in the Department of Chemical Engineering at National Cheng Kung University, after teaching in the Department of Chemical Engineering at National University of Singapore as an assistant professor.

Currently, Dr. Chen's research interests are still on the interfacial phenomena and engineering, with an extension to surface science and catalysis. More specifically, Dr. Chen's group currently works on the extraction and solubilization of plant essence assisted with surfactants, synthesis of zeolitic materials and ordered mesoporous materials, preparation of solid catalysts based on the aforementioned materials and their applications in the catalyzed transesterification of vegetable oils for biodiesel production as well as the catalyzed hydrolysis of chemical hydrides for hydrogen storage and production. In the near future, Dr. Chen's group will also work on the catalyzed conversion of biomass to chemicals and transportation fuel using mesoporous catalysts.

Representative Publications

(1) D. Carr, P.R. Garrett, D. Giles, G. Pierre-Louis, E. Staples, C. A. Miller, B-H Chen, Solubilization of Triolein by Microemulsions Containing $C_{12}E_4$/Hexadecane/Water: Equilibrium and Dynamics, Journal of Colloid and Interface Science, 325(2), 508–515 (2008).

(2) J.–L. Li, D. Bai, B.–H. Chen, Effects of Additives on the Cloud Points of Selected Nonionic Linear Ethoxylated Alcohol Surfactants, Colloids and Surfaces A, 346, 237–243 (2009).

(3) J.-T. Lo, B.-H. Chen, T.-M. Lee, J. Han, J.-L. Li, Self-Emulsifying O/W Formulations of Paclitaxel Prepared from Mixed Nonionic Surfactants, J. Pharm. Sci., 99(5), 2320–2332 (2010).

(4) Y.-Y. Wang, H.Y Chou, B.-H. Chen, D.-J. Lee, "Biodiesel Production from Transesterification of Triolein with Methanol Using Sodium-loaded Zeolites", Bioresource Technology, 145, 248–253 (2013).

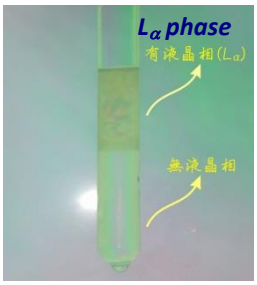
(5) C.–C. Chou, C.–H. Liu, B.–H. Chen, "Effects of the reduction temperature and the pH value of Pt precursor solution of the polyol process on Pt electrocatalysts supported on reduced graphene oxide for oxygen reduction reaction", Energy, 70, 231–238 (2014).

(6) J.-T. Lo, H.–T. Yen, C.–C. Tsai, B.–H. Chen, S.–S. Hou, "Interaction between Hydrophobically Modified 2-Hydroxyethyl Cellulose and Sodium Dodecyl Sulfate Studied by Viscometry and Two-Dimensional NOE NMR Spectroscopy", J. Phys. Chem. B, 118(24), 6922−6930 (2014).

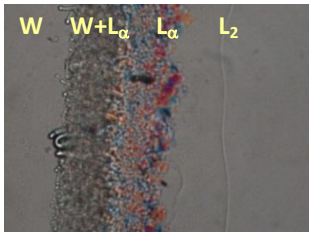
(7) C.–C. Chou, B.–H. Chen, "Hydrogen generation from deliquescence of ammonia borane using Ni-Co/r-GO catalyst", Journal of Power Sources, 293, 343–350 (2015).

(8) Y.–Y. Wang, B.–H. Chen, "High-Silica Zeolite Beta as a Heterogeneous Catalyst in Transesterification of Triolein for Biodiesel Production", Catalysis Today (*in press*).

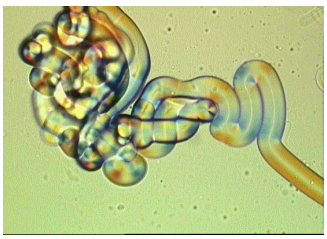
Interfacial Phenomena and Engineering - Phase Behavior of Surfactants

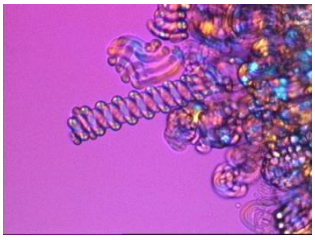


Typical Aqueous Phase Sequence of Surfactant

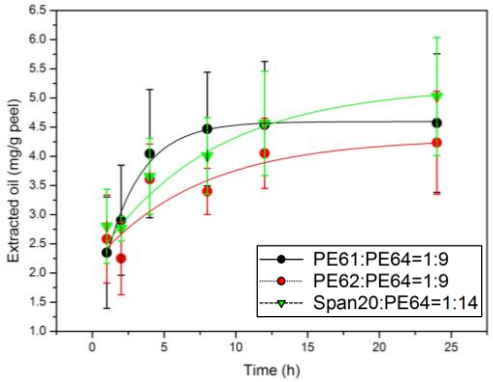


Liquid Crystalline L_α Phase (Myelins)

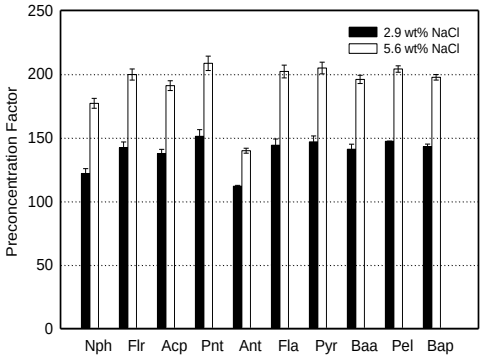




➢ *Application in Preconcentration, Extraction and Solubilization Processes*



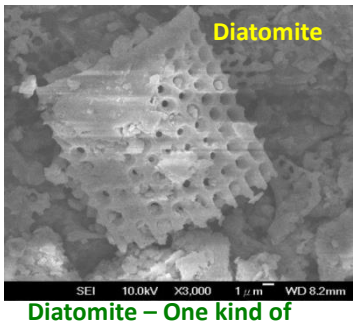
Extraction of lemon oils from lemon peel with microemulsion prepared from mixed nonionic surfactants



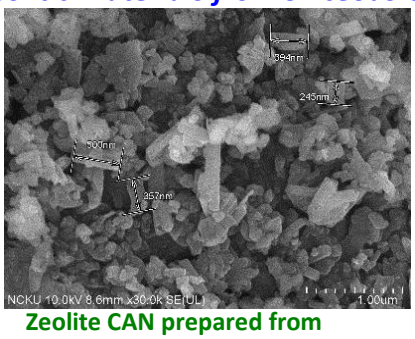
Performance of the L_3-phase extraction on trace hydrophobic solutes such as polycyclic aromatic hydrocarbons (PAHs).

Catalysis and Catalytic Reactions

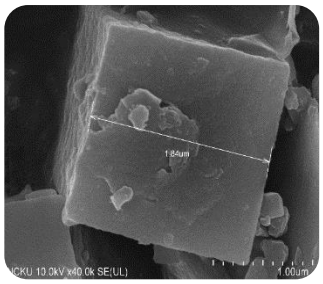
➢ *Synthesis of Zeolites and Zeolitic Materials from Siliceous Clays*



Diatomite – One kind of common siliceous clay

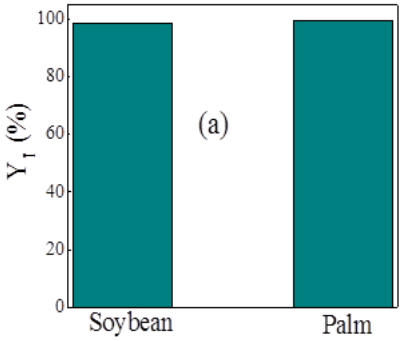


Zeolite CAN prepared from diatomite

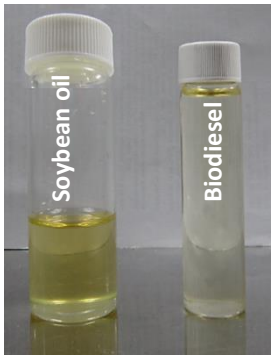


Zeolite LTA prepared from kaolin (another kind of siliceous clay)

➢ Catalysts for Renewable Energy Production



Conversion yield of vegetable oils to biodiesel in presence of *as*-prepared zeolite catalysts.



Biodiesel made from catalyzed transesterification of soybean oil in methanol over zeolite catalysts

A cellular phone recharged from a 2W PEMFC powered by H_2 produced from catalyzed hydrolysis of $NaBH_4$ over light-weighted Co catalyst