

# Paper & Chemical Engineering

## Scholarly Activities 2007-2008

### Theses and Practicum completed

Ranjit Kumar Maharajan, (Advisor: Dr. Douglas Coffin), "Investigation of the Effect of Swelling and Shrinkage on the Wrinkling Response of Locally Wetted Papers Subjected to Tension with Application to Web-Fed Ink-Jet Printing"

PonRajesh Periasamy Vairavanathan, (Advisor: Dr. Catherine Almquist), "Bilayer Film Catalysis of ZnO-CdO and a Comparison with ZnO Film Catalysis"

Haiyi Xiao, (Advisor: Dr. Shashi B. Lalvani), "Low Trans Fatty Acid Containing Hydrogenated Edible Oils"

Rong Zhang, (Advisor: Dr. Lei Kerr), "Zinc Oxide Thin Films for Dye-Sensitized Solar Cell Applications"

### Peer-Reviewed Journal Articles

**Catherine B. Almquist**, Endalkachew Sahle-Demessie, Sridara Chandra Sehker, and Julia Sowash (2007). Methanol oxidation using ozone on titania-supported vanadia catalyst. *Environmental Science and Technology*, **41**(13) pp. 4754-4760.

Bart Wojas and **Catherine Almquist** (2007). Mass concentration and metals speciation of PM<sub>2.5</sub>, PM<sub>10</sub>, and total suspended solids in Oxford, Ohio and comparison with those from metropolitan sites in the Greater Cincinnati Region. *Atmospheric Environment*, **41**, pp. 9064-9078.

Rong Zhang, and **Lei L. Kerr**, "Controlling of ZnO morphologies by adjusting Cd concentration via Chemical Bath Deposition," Vol. 180, pp. 998–1004, *Journal of Solid State Chemistry*, 2007.

**Lei L. Kerr**, Xiaonan Li, Maria Canepa and Andre Sommer, "Raman Analysis of Nitrogen doped ZnO," *Thin Solid films*, Vol. 515, No. 13, pp. 5282-5286, 2007.

Zhaoqiang Fang, B. Claflin, D.C. Look, **Lei L. Kerr**, and Xiaonan Li "Electron and hole traps in N-doped ZnO grown on p-type Si substrate by MOCVD," *Journal of Applied Physics*, Vol. 102, article number 023714, 2007.

Y. -J. Sung and **D. S. Keller**, "Local paper structural properties by non-contacting laser

profilometry”, *Appita Journal*, **61(1)**, 28-34, 2008.

Xiao, H., and **Lalvani, S. B.**, “Hydrogenation of Edible Oils: A Model Involving Competitive Adsorption of Reactants”, *Journal of the American Oil Chemists’ Society*, 84, 11777-1181, 2007.

Mondal, K., and **Lalvani, S. B.**, “Low Temperature Soybean Oil Hydrogenation by an Electrochemical Process,” *Journal of Food Engineering*, 84, 4, 526-533, 2008.

### **Refereed proceedings**

Amandeep Saluja, Jie Pan, **Lei Kerr**, Eunjung Cho, Seth Hubbard , “Gas Sensing Properties of Porous ZnO Nano-Platelet Films”, Paper No. 1035-L11-07, *MRS Proceedings*, Fall 2007.

### **Professional presentations:**

**Sharma, G. and Almquist, C. B. (2007)**, “Ozone-enhanced photocatalytic oxidation of methylene blue” *37<sup>th</sup> Mid-Atlantic Industrial and Hazardous Waste Conference*, March 21-23, Cincinnati, Ohio. ”

PonRajesh Periasamy Vairavanathan and **Almquist, C. B. (2007)**, “Bilayer Film Catalysis of ZnO-CdO and a Comparison with ZnO Film Catalysis.” *12<sup>th</sup> International Conference on TiO<sub>2</sub> Photocatalysis: Fundamentals and Applications, and 13<sup>th</sup> International Conference on Advanced Oxidation Technologies for Treatment of Water, Air, and Soil*, September 24-27, Niagara Falls, NY.

**Coffin, D. W.**, “Paper wrinkling arising from the application and drying of water-based inks,” *2007 International Paper Physics Conference, Proceedings of the 61<sup>st</sup> Appita Annual Conference*. Gold Coast, Queensland Australia, June 2007.

**Coffin, D. W.**, “The Influence of Variability in Paper and Box Properties on Lifetime,” *TAPPI Corrugated Packaging Conference*, Indianapolis, IN, October 30-November 1, 2007.

**Coffin, D. W.**, “Cockle viewed from fundamentals: a few small random insights into the phenomenon,” KCL, Espoo Finland, May 30, 2007.

**Coffin, D. W.**, “On the Mechanical Response of Paper,” *International Paper*, Loveland, OH April 6, 2007.

Hasan and **D.S. Keller**, "Bipolar Spectral Analysis of Paper Formation using Wavelet Transforms", *2007 TAPPI/APPITA Int. Paper Physics Conf., Gold Coast Australia, May 7-10, 2007*

**Lei Kerr**, "Dye-sensitized Solar Cell Research at Miami University", Invited talk at Rochester Institute of Technology, December, 2007.

**Lei Kerr**, "Photovoltaic Research", CFR poster, Miami University, Sept, 2007

**Lei Kerr**, "Solar Cell Materials Research", Ohio Energy Summit, April, 2007.

Rong Zhang, **Marvin Thrash**, and **Lei Kerr**, "Studies on the Absorption of N3 Dye on Nanostructured ZnO Films" *Preparative/Process Chromatography*, June 2007.

Liqiang Zheng, **Lei Kerr**, and **Marvin Thrash**, "*Protein Adsorption on Nanostructured ZnO*", *Preparative/Process Chromatography*, June 2007.

Liqiang Zheng, **Lei L. Kerr** and **Marvin E. Thrash Jr.**, "An Investigation of Protein Adsorption on Zinc Oxide", *2007 Spring AIChE meeting Houston Texas*.

**Marvin E. Thrash Jr.**, "Incorporating water-release and lateral protein interactions in modeling equilibrium adsorption for ion-exchange chromatography", *Presentation at 2007 SEAS research Expo*.

### **Undergraduate Research Supervision**

Patricia Casal, 2007 summer research assistant. "Scale-up of Electrospinning," with Dr. Coffin

Katy Lysaght, Fall 2007 research assistant (with P&G). "Physics of Rubbing and Wiping of Paper Towel," with Dr. Coffin

Evan Briggs, 2007 Undergraduate Summer Scholar, "P-type semiconductor and dye Sensitized solar cells," work with Dr. Kerr

Guy Litt, 2007 Undergraduate Summer Scholar "Oxidization of ethanol vapors over CuO/Fe<sub>2</sub>O<sub>3</sub> catalysts," with Dr. Almquist

Erica Suding, 2007 independent research study, Photocatalytic oxidation of methylene blue over ZnO and Cd-doped ZnO," with Dr. Almquist

### **External Research Grants Awarded**

**Almquist, C. B.**, ~\$69,500 from the US EPA to continue working on the pilot scale ozone-enhanced catalytic oxidation test system and use it to run field tests at a Kraft pulp mill in Hawesville, KY.

**Coffin, D. W.**, The physics of wiping, rubbing and scrubbing with paper towels: Developing standardized tests for evaluating wet-durability of paper towels, **Procter and Gamble**, Principal Investigator (PI), \$166,649

**Lei L. Kerr**, "Defect Chemistry Study of Nitrogen Doped ZnO Thin Films." \$407,067, 2007-2010.

### **Internal Research Grants Awarded**

**Lei L. Kerr**, 2007 Undergraduate Summer Scholar, "P-type semiconductor and dye Sensitized solar cells" work with Evan Briggs (\$3,000).

**Marvin Thrash**, OARS Biomass Undergraduate Project, \$3000

**Marvin Thrash**, Collative Proposal with Central State University, \$2000

**Marvin Thrash**, OARS Small Research Grant, \$1000