



**Joint Seminar**  
**Departments of Mechanical and Chemical Engineering**

**1 pm Wednesday 30<sup>th</sup> May 2007**  
**Lecture Theatre S1, Building 25, Clayton Campus**

**A Dielectrophoretic Platform for Nano-Colloid Manipulation and  
Analysis on Biochips**

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Immuno-colloids and nano-bead DNA probes can dramatically reduce the transport time in antibody-antigen docking and DNA hybridization reactions; and can, with bar-coding, identify a large library of targets. However, before such bead-based microfluidic technologies can replace immuno-assays and DNA micro-arrays, a robust and economical chip-scale colloid manipulation platform must be developed. The center has championed an array of dielectrophoretic technologies that can sort, concentrate, direct and probe nano-colloids on a cheap, disposable chip with minimum periphery instrumentation. This platform is developed with an in-depth analysis of AC particle polarization, which revealed and quantified the important capacitance and conductance effects of the diffuse layer, Stern layer and surface functional groups on the dielectrophoretic mobility of nano-colloids.

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**Professor Hsueh-Chia Chang** is Bayer Professor of Chemical Engineering and Director of the Center for Microfluidics and Medical Diagnostics at the University of Notre Dame. He received his BS and PhD degrees from the California Institute of Technology and Princeton University, respectively, following which he joined the University of California Santa Barbara and later the University of Houston, before moving to Notre Dame. Professor Chang has held a visiting position in the Department of Applied Mathematics and Theoretical Physics at Cambridge University and an adjunct professorship at the National Cheng Kung University in Taiwan. He has authored over 180 journal publications, particularly in the area of complex wave dynamics in thin falling films and in electrokinetics. Professor Chang is currently Editor-in-Chief of the American Institute of Physics journal *Biomicrofluidics* and Associate Editor of the *SIAM Journal of Applied Math*. In 1991, he was awarded the Francois N. Frenkiel award by the American Physical Society, to which he was elected a Fellow in 1997.

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