

**Institute of Energy Technology – Professorship of Renewable Energy Carriers*****Invitation to a Seminar***

**Date:** Friday, October 8, 2010  
**Time:** 16:00-17:00  
**Place:** Maschinenlaboratorium ETH Zürich, ML-J25/26

**Speaker:** **Prof. Patrick Phelan**  
Arizona State University  
School of Engineering for Matter, Transport & Energy  
Tempe, AZ, USA

**Title:**  
**PHOTOTHERMAL ENERGY CONVERSION IN LIQUID NANOPARTICLE  
SUSPENSIONS**

**Abstract** – Liquid nanoparticle suspensions, popularly termed “nanofluids,” have been the subject of numerous investigations because of their interesting thermal transport properties. Their propensity to scatter and absorb electromagnetic radiation enables other applications that can take advantage of both their radiative and thermal transport properties. In particular, we are working to develop direct-absorption solar thermal collectors in which nanofluids serve to absorb incident sunlight, thus heating the fluid directly and more efficiently than conventional solar collectors. Our experimental results, in which we irradiate nanofluids with a continuous-wave laser, demonstrate that boiling can be induced at lower incident light fluxes compared to a thin layer of pure water in front of a black absorptive backing. These findings suggest that improved solar energy conversion systems can be developed, possibly including solar-driven direct-steam generators and thermochemical reactors.

Prof. Pat Phelan received his BS from Tulane University, his MS from MIT, and his PhD from UC Berkeley, all in mechanical engineering. Following a pleasant two years as a JSPS Post-Doctoral Fellow at the Tokyo Institute of Technology, he joined the University of Hawaii as a faculty member in mechanical engineering, before moving to Arizona State University (ASU) in 1996. From 2006 – 2008 he served as the Director of the Thermal Transport Processes Program at the National Science Foundation, after which he returned to ASU, where he is now Professor and Graduate Program Chair for Mechanical & Aerospace Engineering. He has authored or co-authored more than 75 refereed journal articles, was a co-recipient of a Best Paper award at the *2007 Energy Sustainability Conference*, and received the NSF CAREER Award.