

**CORE-CM SEMINAR**  
**Michigan State University — Department of Chemistry**

**Prof. Theodore Goodson**  
**University of Michigan**

**Ultra-Fast Dynamics in Organic and Inorganic Materials with  
Enhanced Optical Effects**

Organic macromolecular materials and small metal cluster systems have been investigated and have shown great potential for applications in photovoltaic (solar) devices, dielectric effects, as well as for enhanced nonlinear and quantum optical effects. This talk will discuss our recent ultra-fast measurements utilizing organic and inorganic nanostructured systems. The excitation mechanism in these systems depends on the nature of the geometrical orientation of covalently attached chromophores in macromolecules, the extent of delocalization in cyclic aggregates, as well as the number of atoms (and type) in small metal clusters. Through ultra-fast time-resolved and nonlinear spectroscopy, we have characterized the mechanism of energy transport and the relative strength of intra-molecular interactions in these systems. For particular assemblies the processes of efficient energy transfer, fast energy re-distribution, and enhanced two-photon absorption cross-sections will be discussed. The enhanced effects illustrated in these systems provide new opportunities for the use of organic and inorganic nanostructured materials in photonic applications.

**Representative Publications**

Raymond, J.E.; Bhaskar, A.; Goodson, T. III ; Makiuchi N.; Ogawa, K.; Kobuke, Y.;

*J. Amer. Chem. Soc.* **2008** 130, 17212-3.

Harpham, M.R.; Suzer, O.; Ma, Ch.Q.; Bauerle, P.; Goodson, T. III;

*J. Amer. Chem. Soc.* **2009**; 131, 973-79

Varnavski, O.; Ramakrishna, G.; Kim, J.; Lee, D.I.; Goodson, T.

*J. Am. Chem. Soc.*, **2010**, 132 (1), pp 16–17.

Donehue, J.E., Varnavski, O.P., Chemborski, R., Lyoda, M., Goodson, III,T.;

*J. Amer. Chem. Soc.*, **2011**, 133, 4819-4828.

Yau, S.H.; Goodson, T. III *Nanoscale*, **2012**, 4(14), 4247-4254

Yau, S.H.; Varnavski, O.; Goodson, T. III *Accounts of Chemical Research*, **2013**, 46,1506-1516.

**Thursday, January 30, 2014**

**12:00 PM**

**Room 1400 – BPS**

**Professor Jim McCusker – Host**

*Accommodations for persons with disabilities may be requested by calling the Chemistry Department at (517) 355-9715, X345 two days prior to the event to ensure sufficient time to make arrangements. Requests received after this date will be met when possible.*