



# Institute for Materials Science

UNCLASSIFIED

## IMS Distinguished Lecturer Series



Professor George C. Schatz  
Northwestern University  
Evanston, IL

### Opportunities for Plasmonics in Lasers and Metamaterials

Wednesday, March 14, 2018  
2:00 - 3:00

MSL auditorium (TA-03 - Bldg 1698 - Room A103)

**Abstract:** This talk will overview the interplay between optics, plasmonics, and excitonics for systems that consist of arrays of gold, silver or aluminum nanoparticles in 1D, 2D and 3D. Two kinds of arrays will be considered, those involving DNA-linked nanoparticles in 3D arrays with subwavelength particle spacings, and those involving 2D arrays of particles where the spacing satisfies a diffraction condition that produces lattice plasmon resonances. The emphasis of research on the DNA-linked nanoparticle structures will be in describing scattering and extinction experiments where issues such as effective medium approximations and Fabry-Perot cavity modes are important. Also of interest are DNA-linked structures with embedded dyes, and structures that exhibit nonreciprocal properties. A recently developed theory of plasmon-mediated resonant energy transfer will also be described. The studies of lattice plasmons include unusual extinction and scattering properties of the lattices that include quadrupole resonances effects for aluminum lattices. This leads to lattice plasmon lasers in which laser dyes are added to the nanoparticle lattices and where the theory needs to couple electrodynamics with a quantum description of the dye photophysics

**Bio:** George C. Schatz is the Morrison Professor of Chemistry at Northwestern University. He received his undergraduate degree at Clarkson University and Ph. D at Caltech. He was a postdoc at MIT, and has been at Northwestern since 1976. Schatz is a member of the National Academy of Sciences, the American Academy of Arts and Sciences, and he has been Editor-in-Chief of the Journal of Physical Chemistry since 2005. Schatz is a theoretician specializing in electronic structure methods, dynamical processes, electrodynamics, and statistical mechanics, who studies the optical, structural and thermal properties of nanomaterials, including plasmonic nanoparticles, catalysts, DNA and peptide self-assembled nanostructures, and carbon-based materials, with applications to chemical and biological sensing, electronic and biological materials, heterogeneous catalysis and solar energy.

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To be on Professor Schatz's Agenda, to participate in the Early Career Lunch, or for general information contact  
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Hosted by Alexander Balatsky \* Director of the institute for Materials Science