



# INSTITUTE SEMINAR

15 December 2014

4:00 p.m.

Fermion

Speaker:

**Hideaki Shirota**

*Department of Nanomaterial Science & Department of Chemistry, Chiba University*

Title:

## **Ultrafast Dynamics of Room Temperature Ionic Liquids: A Third Order Nonlinear Spectroscopic Study**

Abstract:

In this talk, I will show some unique features of the ultrafast dynamics of room temperature ionic liquids revealed by a third order nonlinear spectroscopy: Raman-induced Kerr effect spectroscopy (fs-RIKES). In particular, the following three topics are mainly discussed. (i) Heavy atom substitution effects in room temperature ionic liquids. Heavy atom substitution in a constituent ion for ILs reduces the shear viscosity. This feature is opposite to that in neutral molecular liquids. fs-RIKES studies show a lower frequency shift for the interionic vibrational band in ILs by substituting an atom in the ions with a higher periodic atom. This is possibly due to the weakened interionic interaction by heavy atom substitution. (ii) Comparison between room temperature ionic liquids and neutral molecular liquids/solution. The first moment of intermolecular vibrational spectrum for neutral molecular liquids correlates linearly to the square root of the value of the surface tension divided by the liquid density. The correlation for neutral molecular liquids is different from that for room temperature ionic liquids. (iii) Comparison of aromatic and nonaromatic ionic liquids. In the above correlation for neutral molecular liquids, a single linear correlation is for both aromatic and nonaromatic molecular liquids. On the other hand, the correlation for aromatic ionic liquids is totally different from that for nonaromatic ionic liquids.

---