

# INORGANIC SEMINAR

## Synthesis and Magnetic Properties of Complex Metal

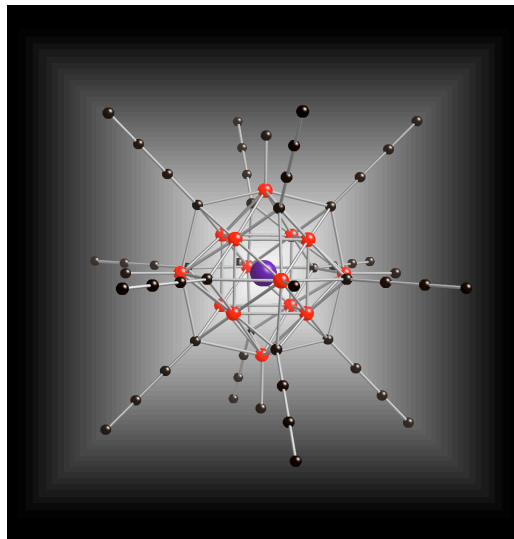
### Carbides Grown In Metal Fluxes

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Mixed metal fluxes have been found to be excellent solvents for carbon, allowing for the synthesis and crystallization of new metal carbide phases. Lanthanide/transition metal eutectic melts (such as  $\text{La}_{0.75}\text{Ni}_{0.25}$ , m.p.  $532^\circ\text{C}$ ) are being explored as fluxes for the growth of phases with transition metal-carbide clusters or networks. Iron is particularly reactive in these solvents, forming iron-carbon 3-D networks or iron clusters capped by carbon. Clusters such as  $\text{Fe}_4\text{C}_6$  (found in  $\text{La}_{21}\text{Fe}_8\text{Sn}_7\text{C}_{12}$ ) and  $[\text{Fe}_{14}\text{B}](\text{C}_x\text{B}_{1-x})_{54}$  (found in  $\text{Ce}_{33}\text{Fe}_{14}\text{B}_{25}\text{C}_{34}$ ) exhibit unusual magnetic phenomena such as spin glass behavior. These carbon-capped iron clusters have also indicated promise as catalysts for conversion of methane into carbon nanotubes. More ionic carbides are obtained from reactions of carbon with other elements in the strongly reducing Ca/Li flux. Products such as  $\text{Ca}_2\text{LiC}_3\text{H}$  and  $\text{Ca}_{11}\text{Sn}_3\text{C}_8$  both feature rare  $\text{C}_3^{4-}$  anions and produce propadiene when reacted with water.



**Wednesday, March 14, 2012**  
**3:30 PM ROOM 1315 CHEMISTRY**

IF YOU WISH MORE INFORMATION PLEASE CALL THE INORGANIC OFFICE AT 262-6815.

Refreshments will be available at 3:15 p.m. outside of the seminar room setup by  
Brandon Kilduff. Thanks Brandon!