Lunedì 24 giugno 2019, ore 12:00
Aula G

il Professor Robert L. Whetten

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terrà un seminario dal titolo:

60-Fold Ligand Equivalence in the Ubiquitous Clusters of Gold & Related Metals (I-$Au_{144}L_{60}$)

La presenza della S. V. sarà molto gradita

Il Direttore del Dipartimento
Michele Maggini

Prof. Flavio Maran

Impetus for our work:

Soon after superconductivity (at T > 30 K) was discovered in the fullerides (A_3C_{60}), J. Friedel (1992) argued that much higher temperature (HTC) superconductivity should emerge from crystalline arrays of large metallic clusters.

Adequate tests of the Friedel-Hypothesis demand pure metal-cluster compounds (to eliminate disorder, compositional and structural) and minimal ligands (to facilitate electron transfer between neighboring metallic clusters).

For this purpose, we proposed (1999) clusters of the icosahedral $Pd_{145}(CO)_{60}$ structure-type, *e.g.*, the 'ubiquitous' $Au_{144}L_{60}$ compounds, as prime candidates.

Experimental advances: A long search has culminated in their —

  (i) complete compositional characterization (via ESI-MS) and

  (ii) total crystallographic confirmation (via XRD) of the chiral-icosahedral (*I*) structure.

Also, enhanced conductivity, and proximity to the insulator-to-metal transition, is favored by recent steps to minimize the ligand shell [Dainese et al., 2018].

New in this report:

We describe how recent NMR spectroscopy investigations [Dainese et al., 2018] led us to consider representation of equivalency among the 60 ligands in $Au_{144}(SR)_{60}$ compounds (-R = -C_2H_5 or -C_3H_8), as well as the likely reasons for symmetry reduction (*I* => D_5 or C_5).

Although many other potential applications of these compounds continue to draw the most attention, we believe that the prospect of HTC (~ 200 K) superconductivity should greatly motivate cooperative research efforts in this direction.