

## W0138

**Crystal Design Strategies on the Way to Multi-dimensional Molecular Metals.** Qiyu Zheng<sup>a</sup>, Stephen Lee<sup>a</sup>, Francis J. DiSalvo<sup>a</sup>, Dhandapani Venkataraman<sup>b</sup>, Travis L. Benanti<sup>b</sup>, Min Yuan<sup>a</sup>, Thomas Devic<sup>a</sup>, Sandrine Perruchas<sup>a</sup>, <sup>a</sup>Dept. of Chemistry and Chemical Biology, Baker Lab., Cornell Univ., Ithaca, NY 14853, <sup>b</sup>Dept. of Chemistry, Univ. of Massachusetts, Amherst, MA 01003.

The field of high temperature superconductors is dominated by metals containing second row main group elements (copper oxides, MgB<sub>2</sub>, and K<sub>3</sub>C<sub>60</sub>). Organic metals have not dominated this field as most organic metals are one-dimensional, and therefore undergo the Peierls metal-insulator transition at low temperature (rather than becoming superconducting). The reason for their one-dimensionality is the ubiquitous  $\sigma$ - $\pi$  herringbone pattern of co-facial planar  $\pi$ -systems (stacks of  $\pi$ -systems, tilted with respect to each other).

In this paper, we report two crystal design strategies which disrupt the herringbone pattern while retaining good  $\pi$ - $\pi$  contacts. Firstly, we adapt design principles from crystal engineering to control the orientation of  $\pi$  systems in extended coordination networks (Ag-nitrile systems). Secondly, we use cubic symmetry, polyhedral clusters (octahedral W<sub>6</sub>S<sub>8</sub> clusters) to distribute  $\pi$ -electrons along all three crystallographic directions.