Observation of d-orbital aromaticity

Aromaticity is a fundamental concept in planar cyclic hydrocarbons that has been expanded to organometallic complexes and all-metal clusters. Aromaticity typically is restricted to \( \sigma \) and \( \pi \) bonding, but computational evidence indicates that transition-metal clusters can have delocalized bonds involving \( d \) orbitals. Lai-Sheng Wang and his coworkers at Washington State University, Richland, and Pacific Northwest National Laboratory now report the first experimental evidence for \( d \)-orbital aromaticity (Angew. Chem. Int. Ed., published online Oct. 17, dx.doi.org/10.1002/anie.200502678). The team created \( \text{M}_3\text{O}_9 \) (\( \text{M} = \text{Mo, W} \)) clusters by laser vaporization of the metals in the presence of \( \text{O}_2 \), then separated the oxide species in a mass spectrometer and characterized them by using photoelectron spectroscopy. On the basis of their experimental and computational data, the researchers conclude that \( d \) orbitals of the three coplanar metal atoms form an unoccupied molecular orbital at the center of the neutral clusters that is occupied by one or two electrons in the \( \text{M}_3\text{O}_9^- \) or \( \text{M}_3\text{O}_9^{2-} \) anion, respectively. Large resonance energies, equal metal-metal bond distances, and other attributes confirm that the anions are aromatic, Wang and coworkers say.

Solar cells go inorganic

Researchers have introduced a new type of solar cell, once limited to the theoretical realm, that is composed entirely of inorganic nanocrystals. Though the efficiency of the inorganic cells, 2.9%, is less than the average of 15% of commercial solar cells, the development may lead to a class of energy-conversion devices that is less expensive and more stable than its traditional silicon-based brethren. UC Berkeley chemistry professor A. Paul Alivisatos’ team spin-