

Abstract Submitted  
for the MAR06 Meeting of  
The American Physical Society

**On the Possibility of Multiple Valence Superatoms** SHIV KHANNA, J. ULISES REVELES, Department of Physics, Virginia Commonwealth University, Richmond Va. 23284, A. WELFORD CASTLEMAN JR., DENNIS BERGERON, PATRICK ROACH, Department of Chemistry and Physics, The Penn State University, University Park, Pa 16802 — It was recently demonstrated that an  $\text{Al}_{13}$  cluster behaves like a halogen atom while an  $\text{Al}_{14}$  cluster has properties analogous to an alkaline earth atom in gas phase clusters containing aluminum and iodine atoms. These observations, together with findings that  $\text{Al}_{13}^-$  is inert like a rare gas atom, have reinforced the idea that chosen clusters can exhibit chemical behaviors reminiscent of atoms in the periodic table, offering the exciting prospect of a new dimension of the periodic table formed by cluster elements, called the superatoms. As the properties of the clusters can be controlled by size and composition, the superatoms offer the potential to create unique compounds with tailored properties. In this paper, we provide evidence of a new class of superatoms that exhibit multiple valences, like some of the atoms in the periodic table, and hence have the potential to form stable compounds when combined with diverse atoms.

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Date submitted: 28 Nov 2005

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