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From Superatoms to Cluster Assembled Materials

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A collaborative effort with the theoretical group of S.N. Khanna at VCU has led to the concept of superatoms comprised of clusters which mimic elements of the periodic table. The latest advances will be presented which support the contention that there should be no limitation in developing a 3-D periodic table based on this idea. As the behavior of clusters can be controlled by size and composition, the superatoms offer the potential to create unique compounds with tailored properties. One of the prime objectives of current research is to lay the foundation for forming new nanoscale materials utilizing these “elements” as the building blocks. This is viewed as one of the most promising frontiers in materials research. The current status of success in this endeavor will be discussed. AWC, Jr. gratefully acknowledges the United States Air Force Office of Scientific Research, Grant #FA9550-07-1-0151, the U. S. Department of Energy, Grant No. DE-FG02-02ER46009, and the U.S. Department of the Army through a MURI Grant #W911NF-06-1-0280, for financial support of the experimental work reported herein.