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COVER STORY

December 22, 2003

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SUPRAMOLECULAR CHEMISTRY

STU BORMAN, C&EN WASHINGTON

Some of the super supramolecular advances this year involved ion recognition, fullerenes, molecular motors, and dendrimers.

The first single molecule to completely encapsulate an ion pair in polar media was synthesized by Jerry L. Atwood and a coworker at the University of Missouri, Columbia [*Chem. Commun.*, **2003**, 940]. Anion-sensing applications are possible because the cation complex forms first and then attracts the anion selectively.

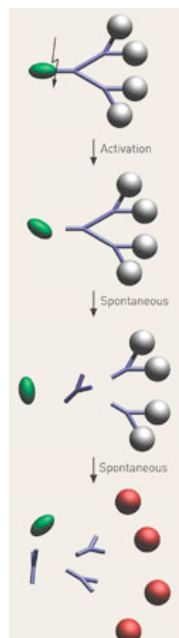
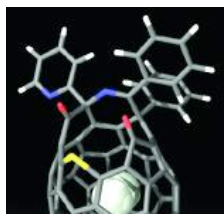
The first open-cage fullerene derivative with an orifice large enough to allow a hydrogen molecule to be inserted into the cage in 100% yield was prepared by Koichi Komatsu and coworkers at Kyoto University, Japan [*J. Am. Chem. Soc.*, **125**, 7152 (2003)]. Hydrogen storage applications are possible.

A supramolecular motor with components that rotate in only one direction was developed by David A. Leigh of the University of Edinburgh, in Scotland, and coworkers [*Nature*, **424**, 174 (2003)]. It's the first molecular motor to be made of components that do not share covalent bonds.

The first single-trigger, multiple-release dendrimers were reported this year [*Angew. Chem. Int. Ed.*, **42**, 4490 and 4494 (2003)]. F. M. H. (Vincent) de Groot of Syntarga B.V., Nijmegen, the Netherlands, and colleagues call their structures "cascade-release dendrimers," and Doron Shabat and coworkers at Tel Aviv University call theirs "self-immolative dendrimers." A similar "dendritic amplification" technique was reported subsequently by Dominic V. McGrath of the University of Arizona, Tucson, and coworkers [*J. Am. Chem. Soc.*, published online Nov. 26, <http://dx.doi.org/10.1021/ja0386694>]. Potential applications include drug delivery or chemical amplifiers.



TRAPPED Atwood and coworkers synthesized this ion-pair trap—the first single molecule to completely encapsulate an ion pair in polar media.

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HYDROGEN CAPSULE Komatsu and coworkers synthesized this open-cage fullerene, which can be filled with hydrogen (white spheres). COURTESY OF KOICHI KOMATSU

EXPLODING DENDRIMER
Single activation of dendrimers designed independently by groups led by de Groot and Shabat causes spontaneous release of multiple end groups. © WILEY-VCH 2003

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