

Comparative study of fullerene-cubane rotor-stator systems

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Fullerenes form a large variety of high symmetry cocrystals with cubane molecules [1]. The basic material, $C_{60}C_8H_8$ has a face centered cubic crystal structure at ambient condition, with significantly expanded lattice, related to the parent fullerene structure. This cocrystal consists of separated sublattices of rotating and static components. The most important structural characteristic is the significant shape and size recognition of the constituent molecules. The unusual structure gives rise to a complex dynamics, called rotor-stator feature, that is different from both the orientationally ordered and the plastic crystals. A series of related materials has been prepared by similar cocrystallization of higher fullerenes and 1,4-disubstituted cubanes [2]. The different size and symmetry of the components slightly modified the rotor-stator properties.

Here we present the formation and crystal structure of the recently synthesized members of the fullerene-cubane cocrystals and discuss the effect of the molecular geometry on the crystal structure and the rotor-stator dynamics. We compare the most important characteristics of these cocrystals with those of the host-guest type derivatives of fullerenes.

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- [2] Pekker, S.; Kováts, É.; Oszlányi, G.; Bényei, G.; Klupp, G.; Bortel, G.; Jalsovszky, I.; Jakab, E.; Borondics, F.; Kamarás, K.; Faigel, G., *Phys. Stat. Sol. (B)* **243**, 3032 (2006).