

Abstract Submitted  
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**Fullerene-Polyhedral Oligosilsesquioxane Organic-Inorganic Hybrids and Applications as a Nanolayered Supercapacitor** YINGFENG TU, CHUN YE, WENBIN ZHANG, CHI-CHUN TSAI, BIN SUN, XIAOHONG LI, STEPHEN Z. D. CHENG — Fullerenes and polyhedral oligomeric silsesquioxane (POSS) organic-inorganic hybrid material was synthesized by esterification of methano[60]fullerene carboxylic acid (MFCA) with POSS-OH. The chemical structure was characterized and proven by matrix assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS), nuclear magnetic resonance (NMR), thermogravimetric analysis (TGA), SEC and UV-Vis spectroscopy. The material has high solubility (more than 10%) in solvents like toluene, THF, chloroform and hexane. The material has high thermal stability: only 1% of total mass lost at 350 °C and 50% at 800 °C. At high concentrations, the solution of fullerene-POSS can absorb nearly the full spectra of the UV-Vis region (200 nm-700 nm). Crystals can be grown from chloroform solution, and the crystal structure was determined by transmission electron microscopy (TEM) and x-ray diffraction as an orthorhombic structure with  $a = 2.10$  nm,  $b = 1.06$  nm and  $c = 3.71$  nm. This indicates a bilayer structure. The alternating layered structure of fullerene (conductive) and POSS (insulating) in the crystal can be used for applications such as supercapacitors.

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