Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Phase morphology of a disk-sphere dyad molecule. LI CUI, JEFFREY COLLET, LEI ZHU, Polymer Program, Institute of Materials Science and Department of Chemical Engineering, The University of Connecticut, Storrs, CT 06269-3136 — A disk-sphere dyad molecule was synthesized by attaching a discotic triphenylene molecule to a spherical polyhedral oligomeric silsesquioxane (POSS) molecule via esterification reaction. The self-assembly behavior of the dyad molecule was studied by differential scanning calorimetry, polarized light microscopy, X-ray diffraction (XRD), and transmission electron microscope. Two-dimensional (2D) XRD results showed the dyad molecules self-assembled into a lamellar structure, which composed of a crystalline POSS layer and a discotic-nematic triphenylene double-layer. The POSS layer consisted four layers of ABCA-stacked spherical molecules. The liquid crystalline triphenylene molecules were parallel and staggered in the double-layer. Computer simulation of the XRD intensity confirmed the proposed structural model. Compared with that of the POSS crystal in bulk (melting point at ca 220 ^{o}C), the melting temperature of POSS crystal was dramatically decreased to 67 ^{o}C, possibly due to effects of the asymmetry molecular shape and plasticization of the discotic triphenylene moieties between POSS layers.

Polymer Program, Institute of Materials Science and Department of Chemical Engineering, The University

Date submitted: 30 Nov 2005 Electronic form version 1.4