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The Origin of Supra-Molecular Columnar Structures from Symmetrically Tapered Bisamides KWANG-UN JEONG, HONG SHEN, MATTEW J. GRAHAM, HUABING WANG, MINGMING GUO, FRANK W. HARRIS, STEPHEN Z. D. CHENG, MAURICE MORTON INSTITUTE AND DEPARTMENT OF POLYMER SCIENCE, THE UNIVERSITY OF AKRON TEAM — A series of symmetrically tapered 1,4-bis[3,4,5-tris(alkan-1-yloxy)benzamido] benzene bisamides (C_nPhBA) were synthesized to study the effect of alkyl chain length on supra-molecular structures. Phase transitions were studied with DSC, PLM, WAXD, IR, SAED, solid-state ¹³C NMR and computer simulations. All of the C_nPhBAs formed a highly-ordered oblique columnar (Φ_{OK}) phase and a low-ordered oblique columnar (Φ_{OB}) phase. The two main driving forces to form these supra-molecular structures were identified: One is the *H*-bond between N-H and C=O groups, and the other is the micro-phase separation of the bisamide cores and the alkyl chains. With increasing alkyl length, the isotropization temperature decreased, while the alkyl chain disordering temperature increased. The 2D lattice structures perpendicular to the columnar axis also increasingly deviated from the pseudo-hexagonal packing with increasing alkyl length. However, the alkyl length did not have a significant influence on the packing along the columnar axis.

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