

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

A critical orientation order of aligned 1D-arrays for templating the growth of oriented lamellae¹ HOWARD WANG, KAIKUN YANG, Institute for Materials Research and Department of Mechanical Engineering, Binghamton University, HUAIPING RONG, MUHUO YU, State Key Laboratory for Modification of Chemical Fibers and Polymer Materials, Donghua University, China — Aligned one-dimensional arrays of nanotube and nanowires are interesting because of their anisotropic mechanical, thermal and electrical properties. Forming composites with polymers is one way to stabilize 1D array for applications. If the matrix is a crystalline polymer, the aligned 1D array can affect the orientation order of polymer crystallization. Studies have shown that isolated individual nanotubes could template growth of lamellar perpendicular to the tube axis. The same is true for highly orientated tube bundles. On the other hand, polymers in random tube composites grow random lamellar stacks. So the question is whether there exists a critical alignment order of 1d-arrays, at which orientation of lamellae becomes globally correlated. But the nematic order parameter alone is not sufficient for defining the alignment order of 1D-arrays. If the local orientation is correlated, it could be either longitudinal or transversal or mixed depending on the nature of particular materials system. Given a global nematic order parameter, how does 1D-arrays' local orientation structure affect the lamellar orientation?

¹HW acknowledges the support through NSF DMR-0711013

Howard Wang
Binghamton University

Date submitted: 20 Nov 2009

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