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Azimuthal Orientational Correlations due to Excluded Volume Epitaxy in Growing Anisotropic Grains ASHOUTOSH PANDAY, SAMUEL GIDO, University of Massachusetts, Amherst, MA 01003 — The understanding of the microstructure of anisotropically shaped grains can have a strong influence on a range of material properties, including transport, mechanical and electro-optical properties. A grain-structure related phenomenon, called Excluded Volume Epitaxy (EVE) is reported in this study. EVE is a local, inter-grain orientational correlations effect, which results from a combination of sporadic nucleation of anisotropic grains and impingement of growing grains. Due to EVE, the anisotropically shaped grains have a tendency to be similarly aligned in a local neighborhood, despite the fact that there is no global orientation in the sample. This effect has been verified by transmission electron microscope (TEM) images of lamellar block copolymers and optical micrographs of small molecule crystals. Additionally, to quantify the effect of EVE, a modeling and simulation study involving random nucleation and subsequent growth of anisotropic grains was performed. The simulation study revealed a tendency for azimuthal, inter-grain orientational correlation and re-confirmed the experimental observation of EVE.

Ashoutosh Panday
University of Massachusetts, Amherst

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