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Quantitative Grain Size Distributions of Magnetic Organic Thin Films[1] THOMAS GREDIG, K. PAUL GENTRY, California State University Long Beach, IVAN K. SCHULLER, University of California San Diego — Many electronic, optical, and magnetic properties of organic thin films depend on the precise morphology of grains. Quantitative grain size distributions of an asymmetric organic molecule are presented and correlated with the magnetic characteristics. Iron phthalocyanine (FePc) thin films are grown on sapphire substrates at varied deposition temperatures to study the effect of grain growth and to experimentally quantify the grain size distributions in organic thin films based on atomic force microscopy images. The data of over 3000 grains for each sample show a pronounced asymmetric growth of grains from a spherical to an elongated needle-like shape. The size along the major axes increases from 35nm to 200nm and is distributed in a different way than the minor axes, which grow from 25nm to 90nm. The dissimilar distributions are attributed to an asymmetric growth rate. Low-temperature hysteresis loops and temperature-dependent magnetization curves for these FePc thin films illustrate the effect of the length of quasi one-dimensional Fe chains on the magnetic properties.

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Thomas Gredig
California State University Long Beach

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