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The effect of substrate temperature and annealing time on the morphology of metallophthalocyanine thin films: an AFM study AMOS SHARONI, CORNELIU COLESNIUC, CASEY MILLER, GE LIU, BERND FRUHBERGER , IVAN K. SCHULLER , Physics Department, University of California-San Diego, 9500 Gilman Drive, La Jolla CA 92093 — Atomic force microscopy (AFM) measurements were preformed on Iron-phthalocyanine (FePc) thin films in order to investigate their topographical features as a function of preparation parameters. FePc was grown on A-plane sapphire in an organic molecular beam epitaxy system with a base pressure of $\sim$ 5x10^{-10}Torr, using a low temperature Knudsen cell. Samples were deposited with different substrate temperatures, ranging from ambient temperature and up to 250 C, and then annealed *in situ* up to 8 hours without modifying the temperature. All other growth parameters were unchanged. Upon increasing temperature, the AFM measurements reveal a transition from a granular morphology, with grain size of $\sim$ 50 nm, to a flat terrace structure with monolayer high steps and clear pinholes. Annealing results in different degrees of morphological reorientation. The size of the pinholes grows with elevating the temperature further, and the FePc film attains rod-like crystal shapes (100 nm wide and 1 micron long), with no preferred direction. Schemes towards obtaining pinhole-free films will be discussed. This work was supported by AFOSR MURI# F49620-02-1-0288.

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