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Vapor deposition polymerization of a conjugated n-type polyimide ALEXANDER PAPASTRAT, SHUAI ZHU, MITCHELL ANTHAMATTEN, University of Rochester — We are employing vapor deposition polymerization (VDP) to investigate the polymerization of two-component conjugated polyimides. A novel polyamic acid film containing 1,4,5,8-naphthalenetetracarboxylic dianhydride (NTDA) and 4,4'-oxydianiline (ODA) subunits was prepared by VDP onto flat glass substrates. Understanding the relative rates of monomer adsorption, solid-state polymerization, and small molecule crystallization is important to establish control of film morphology and properties. Two true Knudsen sources were designed to co-deposit reactive monomer components. The sources emit according to a cosine flux distribution in vacuum, and are rate-controlled to vary monomer molar flux ratios. Polyimides deposited using reactive five-membered ring dianhydrides form homogeneous, crystalline-free films. On the other hand the six-membered ring NTDA monomer is much less reactive, for the NTDA-ODA pair and polymerization competes with monomer crystallization. The objective of this study is to examine the propensity of monomer components to either polymerize or crystallize. Formed crystals were studied using FT-IR, X-ray diffraction, and polarized optical microscopy. Identification of crystalline components, their nucleation rates, and their crystal habit will be discussed.

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