

蒸着速度がポルフィリン誘導体薄膜の相転移に及ぼす影響 : pMAIRS および GIXD による解析

The Impact of Kinetically Restricted Orientation on Thermal Conversion of Zinc Tetraphenylporphyrin Thin Films to the Triclinic and Monoclinic Phases

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Thin films of organic semiconductor, zinc tetraphenylporphyrin (ZnTPP), can be prepared by both wet- and dry-processes. Since the device performance strongly depends on the molecular aggregation structure represented by the molecular orientation in the thin film, both analysis and control of the molecular anisotropic structure are of great importance. Although many studies have been reported on the device application, however, the structural analysis of the ZnTPP thin film is very limited. In the present study, the powerful combination of p-polarized multiple-angle incidence of resolution spectrometry (pMAIRS) and grazing X-ray diffraction (GIXD) is applied for the structural analysis of ZnTPP thin films prepared as a function of the deposition rate. The deposition rate is found to have an impact on the initial film structure and also its conversion by thermal annealing. At a slow rate, the film converts to the thermodynamically stable phase (monoclinic), via the metastable phase of triclinic (Figure 1). A fast evaporated film, on the other hand, indicates an abnormal thermal conversion: the amorphous phase is directly converted to the monoclinic one through no the triclinic one (Figure 1).

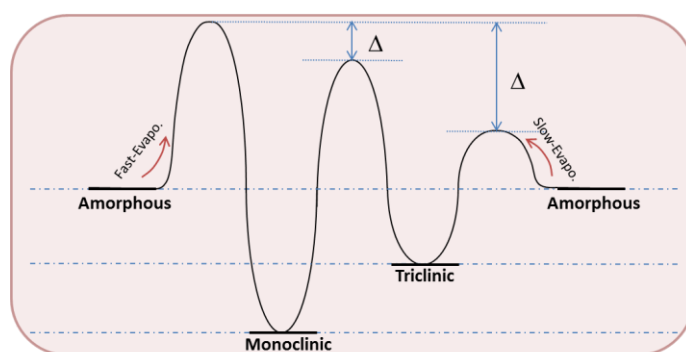


Figure 1 Potential diagram of different polymorphs in a ZnTPP evaporation film.

[1] Hasegawa, *Anal. Chem.* **2007**, 79, 4385.