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Orientation of perylene derivatives on semiconductor surfaces

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Abstract

The orientation of the perylene derivatives 3,4,9,10-perylenetetracarboxylic dianhydride (PTCDA) and *N*,*N*′-dimethyl-3,4,9,10-perylenetetracarboxylic diimide (DiMe-PTCDI) on sulphur passivated GaAs(1 0 0) surfaces and its impact on the optical properties were studied by means of near-edge X-ray absorption fine structure spectroscopy (NEXAFS), Raman spectroscopy, and variable angle spectroscopic ellipsometry (VASE). NEXAFS shows that PTCDA molecules lie flat on the substrate with their molecular plane parallel to the substrate surface. DiMe-PTCDI molecules grown on the same type of substrates are tilted with respect to the substrate surface and are predominantly oriented with their long axis parallel to the [1 1 0] direction. The optical properties of these films investigated by VASE show that the DiMe-PTCDI films exhibit a much stronger optical anisotropy than the PTCDA films.

Author Keywords: Organic films; PTCDA; Structural properties; Optical anisotropy

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