

## VASE and IR spectroscopy: excellent tools to study biaxial organic molecular thin films: DiMe-PTCDI on S-passivated GaAs(100)

M. Friedrich<sup>a</sup>,  <sup>a</sup>, C. Himcinschi<sup>a</sup>, G. Salvan<sup>a</sup>, M. Anghel<sup>a</sup>, A. Paraian<sup>a</sup>, Th. Wagner<sup>b</sup>, T. U. Kampen<sup>a</sup> and D. R. T. Zahn<sup>a</sup>

<sup>a</sup> Institut für Physik, Technische Universität Chemnitz, D-09107, Chemnitz, Germany

<sup>b</sup> L.O.T.-Oriol GmbH, Im Tiefen See 58, 64293, Darmstadt, Germany

Available online 24 April 2004.

### Abstract

Spectroscopic ellipsometry was employed to determine the complex refractive index and dielectric function of a *N,N'*-dimethylperylene-3,4,9,10-dicarboximide (DiMe-PTCDI) film grown on S-GaAs(100). The optically biaxial film shows strong anisotropy. The maximum difference of the dielectric function is observed in the substrate plane. In the low energy absorption free near infrared range maximum and minimum values for the dielectric tensor components of approximately 4.5 and 2.6 are determined in the film plane while a value of 3.2 is determined for the direction perpendicular to the surface. The strong in plane anisotropy is confirmed by infrared reflection spectroscopy. From the investigations we can conclude that the DiMe-PTCDI molecules in the organic layer are predominantly oriented with their long axis parallel to the [011] direction of the GaAs substrate and tilted with their molecular plane by an average angle of  $\approx 62^\circ$  with respect to the substrate plane.

**Author Keywords:** Generalised ellipsometry; Infrared spectroscopy; Anisotropy; Organic molecular thin film