**Applied Surface Science**
Volumes 175-176 , 15 May 2001, Pages 363-368

doi:10.1016/S0169-4332(01)00069-1 Cite or Link Using DOI


# Crystallinity of PTCDA films on silicon derived via optical spectroscopic measurements

**G. Salvan, C. Himcinschi, A. Yu. Kobitski, M. Friedrich, H. P. Wagner, T. U. Kampen and D. R. T. Zahn**

Institut für Physik, Technische Universität Chemnitz, D-09107 Chemnitz, Germany

Accepted 26 October 2000 Available online 7 May 2001.

## Abstract

Optical spectroscopies: Raman, infrared (IR) and photoluminescence (PL) were used to investigate the influence of the substrate temperature on the film formation of the organic molecule 3,4,9,10-perylenetetracarboxyl dianhydride (PTCDA) on hydrogen-passivated silicon(1 0 0) substrates. Raman spectra exhibit four phonon bands below 125 $cm^{-1}$, indicating the crystalline nature of the films. The spectral changes of both Raman- and infrared-active modes reflect that the size of the individual crystals increases with the substrate temperature during growth. Moreover, they support an increase in the content of the α-phase at the expense of the β-phase. The rising background in the high frequency range of the Raman spectra is related to an enhancement of the PL efficiency connected to a reduced number of non-radiative centres of recombination. Time-resolved PL measurements reveal that the PL decay time increases with the substrate temperature, approaching the value characteristic for a PTCDA single crystal.

**Author Keywords:** PTCDA; Silicon; Raman; Infrared; Photoluminescence spectroscopy

**PACS classification codes:** 78.30 Jw; 78.55 Kz; 78.66.Qn

Corresponding author. Tel.: +49-371-531-3028; fax: +49-371-531-3060; email: salvan@physik.tu-chemnitz.de