o.m8.p11 Growth of hexaphenyl thin films - preferred orientation of molecules on various substrates, R. Resel, G. Leising, *Institut für Festkörperphysik, Technische Universität Graz, A- 8010 Graz, Austria.*
Keywords: organic thin film growth, preferred orientation, X-ray diffraction - pole figure technique.

Hexaphenyl ($C_{36}H_{26}$) is an electroactive organic material with high potential for future application in opto-electronic devices like light emitting diodes, plastic solar cells or even in solid state lasers. These applications are based on thin films with a thickness of about 100 - 100Onm. Since the optical and electrical properties of hexaphenyl are highly anisotropic, the preferred orientation of the crystallites within these thin films are essential for obtaining highly efficient applications.

Different types of preferred orientation of the crystallites within the films was analyzed and subsequently the orientation of the molecules relative to the substrates was determined. Depending on the sample preparation conditions - like type of substrate, substrate temperature, deposition rate, a.o. - different types of preferred orientations are observed: two types of highly ordered growth are found at deposition on isotropic substrates like glass or ITO coated glass, another type of growth is induced by graphoepitaxial film preparation, epitaxial growth can be achieved on single crystalline substrates like GaAs(l00), GaAs(111) and KCl (100).

The films are characterized by X-ray diffraction - pole figure technique, by transmission electron diffraction and by Atomic Force Microscopy.

Following theoretical considerations, it could be shown that the preferred orientation of the crystallites depends on intermolecular interactions within the crystal structure as well as on the interaction of the molecules with the substrates. In case of weak interaction of the molecules with the substrates natural cleavage planes of the crystallites are set up parallel to the surface of the substrate. Atomic force microscopy show layer by layer growth (Frank - van der Merwe). Enhanced interactions of the molecules with single crystalline substrates lead to island type growth (Volmer - Weber) with epitaxial relations. Although large lattice mismatch between hexaphenyl and the substrates are present, the crystallites grow highly ordered along defined crystallographic directions. However, the interpretation of the growth mode is not an easy task: different orientations of the crystallites are found under the same growth conditions, complicated twinning effects of the crystallites and polymorphism of hexaphenyl has to be taken into account.

o.m8.p12 HRXRD determination of the shape of the composition profile in quaternary InGaAsP/InP superlattice. M. Wojcik, J. Gaca, W. Strupinski. *Institute of Electronic Materials Technology 01- 919 Warsaw, Wolczynska 133.*
Keywords: surface crystallography.

The chemical composition profile of quaternary InGaAsP/InP superlattice has been investigated by means of simulation of X-ray diffraction profile employing Darwin dynamical diffraction theory. It was found that the modification of the mutual relation between the amount of As and P atoms in InGaAsP layer and simultaneous variation of the width of the InGaP and InAsP interfaces have similar influence on the X-ray diffraction profile. This effect makes the determination of the chemical composition profile by means of HRXRD technique difficult. In order to avoid this problem it is necessary to prepare the sample, where above mentioned interfaces does not appear. It is possible to check whether they are present by measuring the ratio of the intensity between the main and first satellite reflections. If there are no InGaP and InAsP interfaces, the chemical composition profile can be determined using only HRXRD technique.

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