

## 1.16 Evaluation of Functional Groups and Precursors for the Growth of Organic Thin Films by Molecular Layer Deposition

(T. Dietrich, R. Schlessler and Z. Sitar)

The incompatibility of the lattice constants between inorganic substrates and organic materials is a main topic in heteroepitaxy experiments. This can be overcome by a modified growth strategy with molecular layer deposition. This technique (in combination with *in situ* polymerization) allows the controlled growth of perpendicular unidimensionally oriented organic multilayers. The growth method consists in the alternate evaporation of two monomers, which, due to differential chemisorption and re-evaporation of additional material, grow alternately monolayer by monolayer in a self-terminating growth mode.

Different material combinations have been tested, some of the compounds in question were evaporated from low-temperature effusion cells, some were handled in a system of external vapor injectors. First experiments with pyromellitic acid dianhydride (PAD) and 4,4'-diaminodiphenylether (DDE) and with terephthalic acid dichloride (TOC) and DDE showed that careful selection of the compounds is crucial in order to obtain the desired reactivity for the self-terminating monolayer growth of the organic molecules. Growth experiments performed on a quartz crystal thickness monitor demonstrated the anticipated self-terminating monolayer growth. The polymerization reactions were monitored by FTIR spectroscopy and X-ray photoelectron spectroscopy. After the completion of the mentioned basic investigation, compounds with nonlinear optically active chromophores will be implemented.