Drying Issues and Process Scale up of Solvent Casted Films for Flat Panel Displays and Organic Electronics

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Introduction

Drying of solvent processed thin films plays an important role in the production of many high-quality products for flat panel display industry and organic electronics thin films. Drying often determines capacity of the process and quality aspects of the final product. Dissolved coating components are applied on a substrate and subsequently dried to a homogeneous or, e.g in case of a bulk heterojunction polymer solar cell, to a heterogeneous two-phase film.

In this contribution an overview about current research fields and challenges in drying of solvent processed thin films are given concerning solvent diffusion, solid diffusion, convection and phase separation during drying with respect to thin films for displays and organic electronics.

In order to design technical drying processes, model calculations using thermodynamic data, heat and mass transfer data and kinetic parameters are necessary. The model approaches which have to be used to simulate a complex drying process are briefly shown and calculation results to simulate a technical drying process for e.g. protection or retardation foils for LCD panels in a modular concept are shown in a second part of the presentation. hroughout the last decades the demand for high quality coatings has strongly increased. Optical foils and printed electronics have to be produced with thickness deviations below 1 µm. Recent studies about surface tension driven convection flows [1]. show that laterally non-uniform

[1] Unpublished. ISCST shall not be responsible for statements or opinions contained in papers or printed in its publications.

drying of polymer coatings might lead to an undesirable surface roughness. Besides temperature inhomogeneities, varying gas phase mass transport coefficients are the main reason for significant differences in the local drying rate of polymer coatings. For a better understanding of the polymer drying process - especially in the case of laterally small structures (e.g. printed electronics) - the influence of the gas phase mass transport coefficient on the local drying rate was investigated in a fundamental study.

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