

## SWELLIPSOMETRY IN TWENTE: MEASURING POLYMER SWELLING BY IN-SITU ELLIPSOMETRY

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Thin and ultra-thin (<100 nm) polymer films are frequently used in important technological areas, including coatings, barrier and membrane applications. In these areas the films are frequently exposed to interacting penetrants. The interactions may significantly change equilibrium and dynamic properties of the thin film systems, thereby influencing their performance. In addition, it is known that the reduction of polymer film thickness below about 100 nm may result in the manifestation of, so called, nano-confinement effects. This term relates to the pronounced departure of the ultra-thin polymer properties from those of the bulk.

In-situ spectroscopic ellipsometry is a powerful technique for monitoring dynamic changes in properties of thin films in contact with penetrants. This non-intrusive technique allows for very high precision, accuracy, and temporal resolution. In this contribution we show several examples in which the potential of the technique is utilized. The examples include studies on temperature-induced transitions of penetrant diffusion mechanisms in the vicinity of glass transition, probing surface diffusion in ultra-thin glassy films, and thin film composite membrane behavior under non-equilibrium permeation conditions.