Nanostructured surfaces

New ellipsometric technique for characterization of ultrathin thermo-responsive polymer films in liquid ambient

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Ellipsometry is a valuable tool for studying ultrathin thermo-responsive films that permits to record real-time sub-nanometer transformations in structure of the films during changes in temperature of the liquid ambient [1]. Thermo-responsive 'smart' coatings are able to change affinity toward proteins and cells under temperature stimuli and therefore have potential applications in biology and medicine.

Molecular films are often single layers. They can be porous with a significant volume fraction containing ambient. The ambient interface can be poorly defined, as surface coverage can be incomplete. Such films are called *ultrathin* to distinguish them from thicker films, which have a different optical behavior [2]. Ultrathin films have a thickness $d \ll \lambda / 2\pi n_f$, typically < 15 nm in dry state. Since Δ is the main parameter that varies for ultrathin films by traditional ellipsometric measurement, the two unknowns, d and n_f, are strongly correlated. One of possible way to overcome the correlation problem was proposed in our earlier work [3]. Testing this method on systems containing ultrathin thermo-responsive coatings in liquid ambient is the main objective of our research.

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