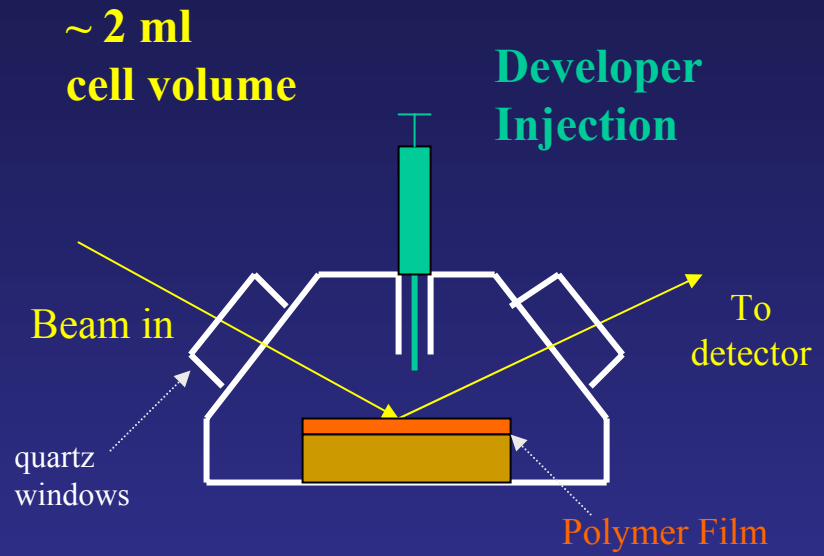
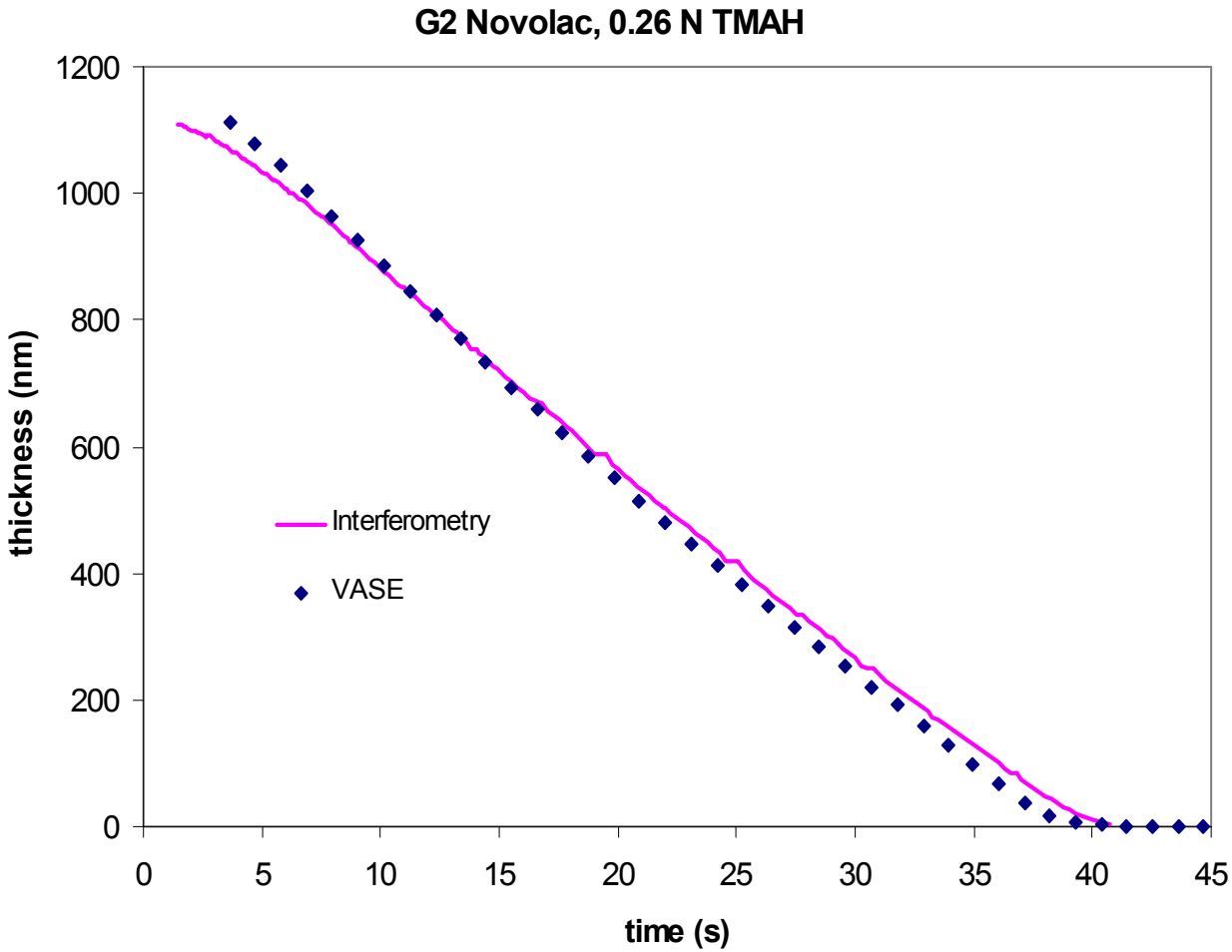
Spectroscopic Ellipsometry as a Tool for Studying Dissolution



- Measure dissolution rate of bulk and thin films
- Study swelling and interfacial layers during dissolution

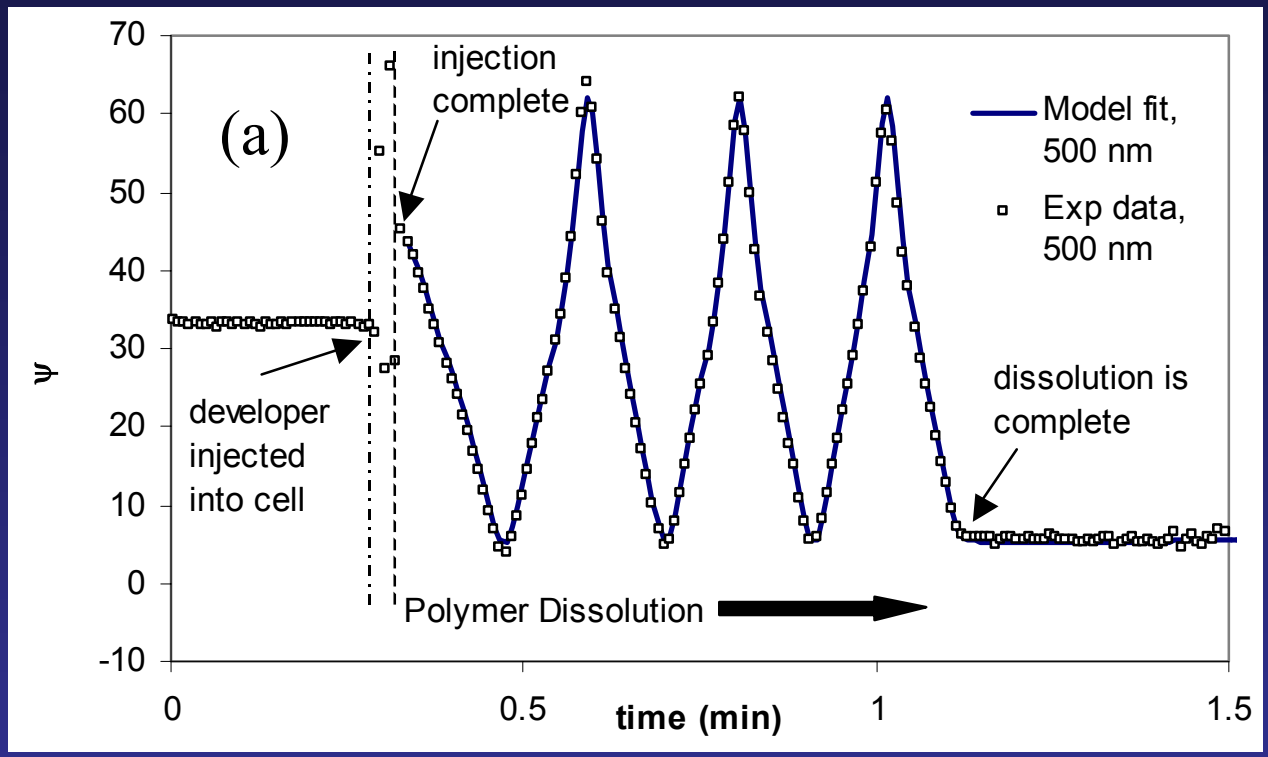
Comparison of Ellipsometry and Interferometry



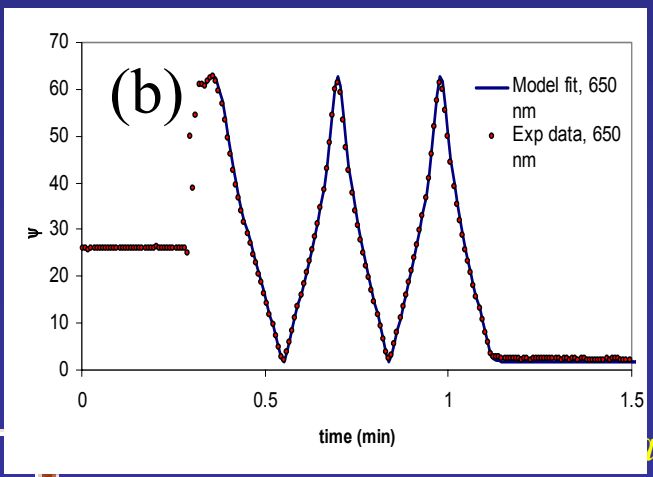
- The plot to the left shows good comparison between the dissolution rate measurement of interferometry and ellipsometry

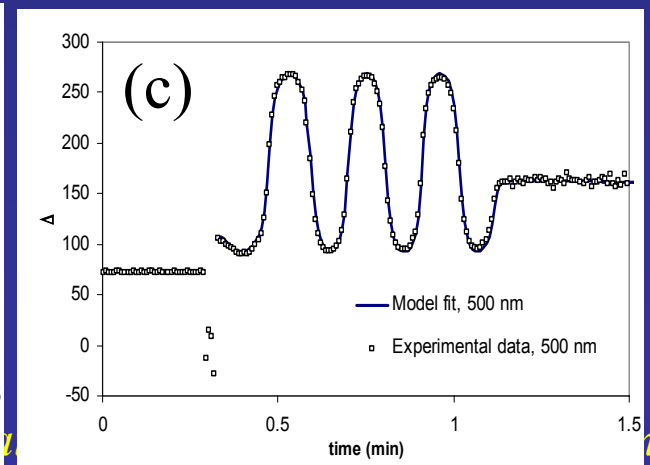
- Excellent model fits have been obtained for several photoresist resins with a single layer model

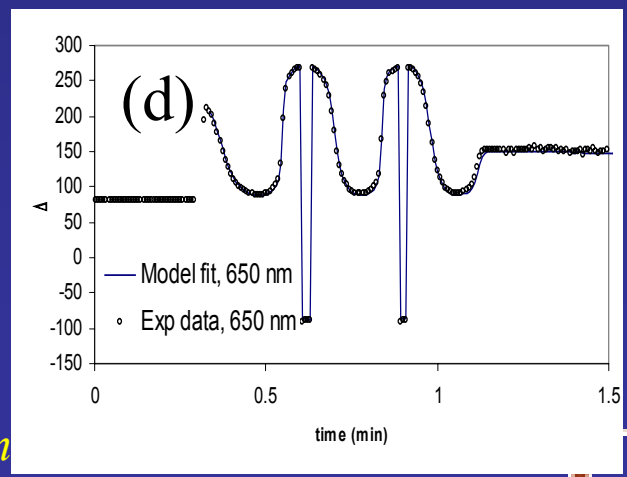
Typical Model Fits to Raw Data



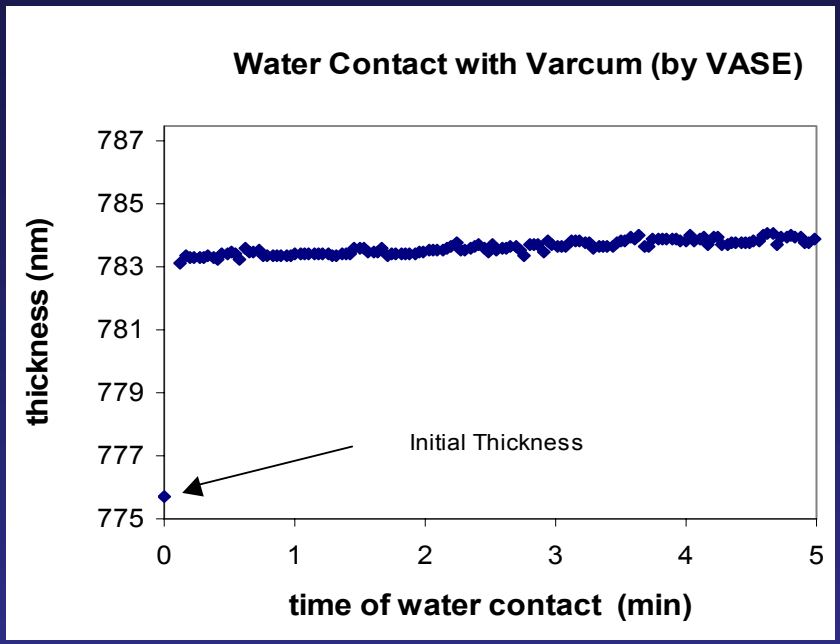
The raw data (ellipsometric angles, ψ and Δ), are shown plotted against time for a typical dissolution exp. Also shown are the model fits to the data. Ψ is shown at 500 nm and 650 nm (plots a and b) and Δ is shown at 500 nm and 650 nm (plots c and d). The model shown is a single layer model, varying only the thickness of the layer.(The index of refraction is held constant over time in the mdoel). Excellent fits are obtained with this model.

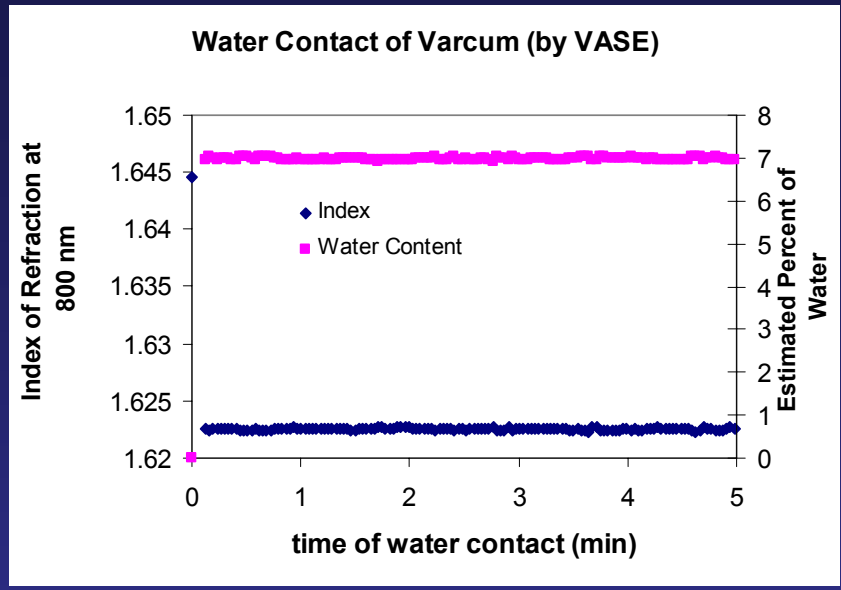


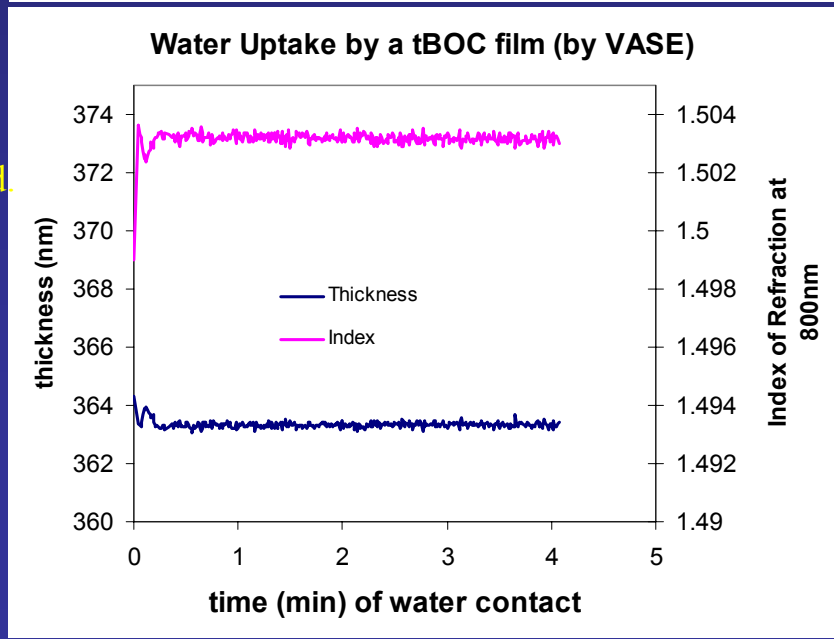




Study of Water Sorption with Ellipsometry







These plots show a simple experiment in which water is poured into the cell, and the changes in thickness and index are monitored. For a hydrophilic novolac resin (Varcum), ~ 1% swelling is observed. A corresponding decrease in the index of refraction is also observed. Using an effective medium approximation (EMA) The percent uptake of water has been estimated at 7 %.

For a hydrophobic resin (tBOC styrene), no thickness change or decrease in the index of refraction is observed, indicating very little water sorption into the film