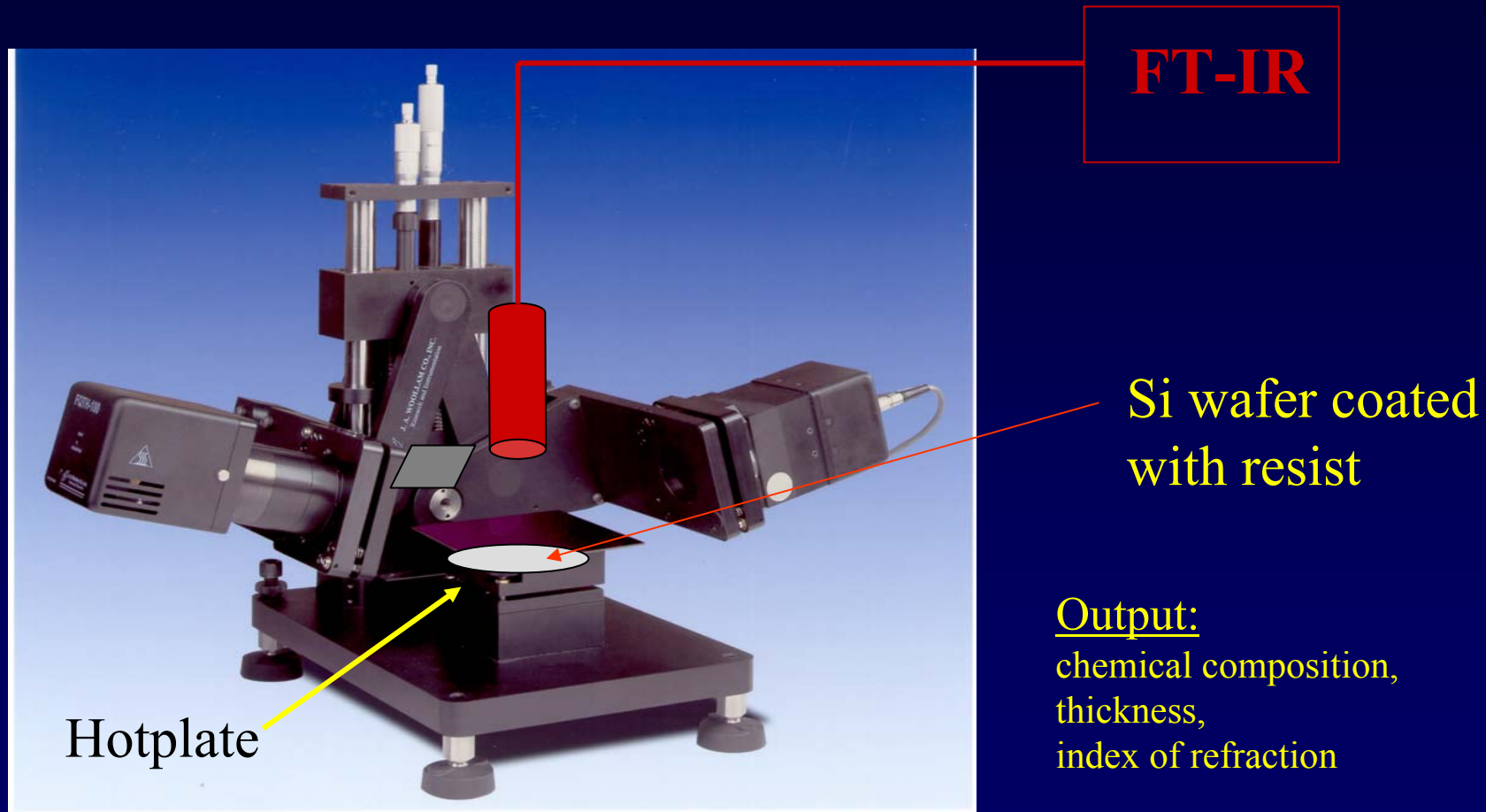


# Method for simultaneously measuring kinetics, film relaxation (free volume during PEB)



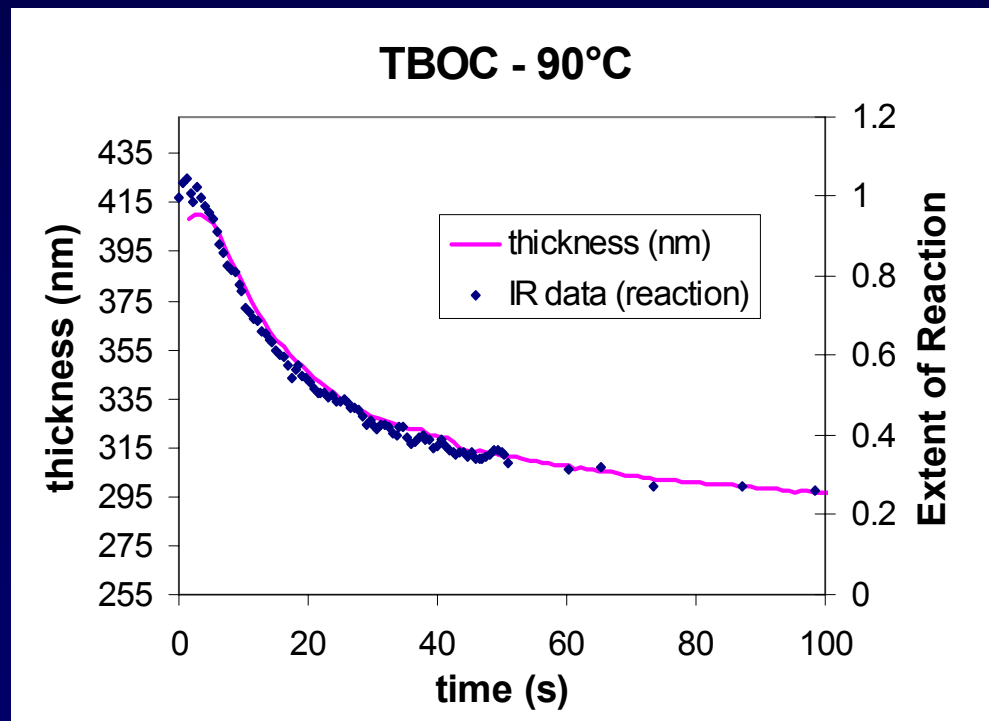
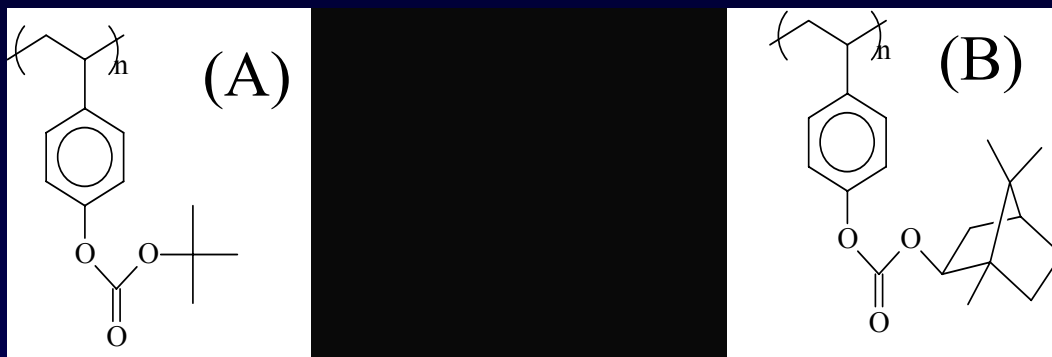
Real time, spectroscopic ellipsometer (J.A. Woollam M-2000)  
combined with FTIR

# Results of Free Volume Studies by Simultaneous FTIR/VASE

- The time lag between the acid catalyzed deprotection reaction and the corresponding thickness loss (film relaxation) is related to the amount of free volume generated during the PEB.

This is an important parameter to measure to gain a fundamental understanding of acid diffusion (CD bias).

- The plot to the right shows that for polymer A (tBOC styrene), there is no observable lag between the reaction and the film relaxation, indicating an undetectable amount of additional free volume formed due to the deprotection reaction.



# Results of Free Volume Studies by Simultaneous FTIR/VASE

- The plots below show that for Polymer B, there is a clear lag between the deprotection reaction and the film relaxation. This lag is indicative of a large amount of free volume generated during the PEB, which is expected to influence the behavior of acid diffusion during PEB.
- The primary conclusion is that the size of the protecting group has a strong influence on the free volume/acid diffusion behavior.

