

## Deposition of Poly[2-(perfluorooctyl)ethyl acrylate] from Liquid CO<sub>2</sub> High Pressure Free Meniscus Coating – Uniformity and Morphology

김재훈\*, Ruben G. Carbonell<sup>1</sup>, 김재덕  
한국과학기술연구원; <sup>1</sup>North Carolina State University  
(jaehoonkim@kist.re.kr\*)

Ultrathin fluoropolymer films were prepared by depositing poly[2-(perfluorooctyl)ethyl acrylate] (PFOEA) on 12.5 cm diameter silicon wafer substrates using high-pressure free meniscus coating (hFMC) with liquid CO<sub>2</sub> (l-CO<sub>2</sub>) as a coating solvent. Dry film thickness across the wafer substrate and the morphology of deposited films were characterized as a function of coating conditions – withdrawal velocities, solution concentrations and evaporation driving forces ( $\Delta P$ ). Thickness measurements by ellipsometry revealed that at zero or low evaporation driving forces ( $\Delta P = 0-0.0138$  MPa), highly uniform films with thicknesses in the range of 7–30 nm were deposited over the entire concentration range (1–7 wt%). However, films deposited at high evaporation driving forces ( $\Delta P = 0.0414-0.0552$  MPa) or larger concentrations (5–7 wt%) with a  $\Delta P$  of 0.0276 MPa were thicker (35–70 nm) and less uniform. Optical microscopy and atomic force microscopy (AFM) were used to characterize film morphology including drying defects and film roughness. Films deposited from l-CO<sub>2</sub> hFMC were much thinner and more uniform, and exhibit much fewer drying defects and lower RMS roughness.