

Surface Properties of Poly[2-(perfluorooctyl)ethyl acrylate] Deposited from Liquid CO₂ High Pressure Free Meniscus Coating

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Surface characteristics of poly[2-(perfluorooctyl)ethyl acrylate] (PFOEA) films deposited using a high-pressure free meniscus coating (hFMC) process with liquid CO₂ (l-CO₂) as a coating solvent on 12.5 cm diameter silicon wafer substrates were investigated using contact angle measurements, atomic force microscopy (AFM), X-ray photoelectron spectroscopy (XPS), and near-edge X-ray adsorption fine structure (NEXAFS) spectroscopy. The results were compared with surface property measurements of PFOEA films deposited from 1,1,2-trichlorotrifluoroethane (Freon113) under normal dip coating conditions at atmospheric pressure. NEXAFS measurements showed that perfluoroalkyl groups in the films from l-CO₂ and Freon113 were well-organized and oriented normal to the substrate at the air/polymer interface. AFM images and XPS measurements revealed that a terrace-like structure of the PFOEA film from l-CO₂ resulted in carbonyl group exposure at the air/polymer interface. This leads to smaller contact angles on the films cast from l-CO₂ relative to the specimens deposited from Freon113.