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Reflectivity and GISAXS Characterization of Low-k Films. Jan Ilavsky, Dale W. Schaefer, Argonne National Laboratory, Argonne, IL.

Low-dielectric constant (low-k) films were studied using X-ray reflectivity, grazing-incidence small-angle scattering (GISAXS) and diffuse scattering. The films were CVD deposited on silica wafers and studied before and after removal of a sacrificial porogen. Based on the shift of the critical edge, the density dropped from 1.20 g/cm^3 to 0.8 g/cm^3 on porogen removal, consistent with 40 vol% porosity. The GISAXS results indicate that the internal structure of the films contains 0.5 nm domains before and 1.3 nm pores after porogen removal, the later being dependent on processing. Reflectivity measurements indicate extremely smooth films, with thicknesses around 300 nm.

GISAXS show the films are internally very homogeneous. The pores are isotropic and uniform across the the film.