

Abstract Submitted
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Determination of the Internal Structure of Plasma Polymerized Films via X-ray Reflectometry¹ HOLLEY WICKWIRE, DAN DREYER, MARK FOSTER, University of Akron — Passive filters for photonics can be made using multilayer polymer films deposited using Plasmas Enhanced Chemical Vapor Deposition. In this process, gaseous monomer is fragmented into reactive radical species by interaction with plasma. These radicals react with one another as they deposit on a substrate from a flowing stream of carrier gas, forming a complex cross-linked structure. The objective of this work is to determine the internal structure of the plasma polymerized films and the manner in which cross-link density and equilibrium degree of swelling vary with plasma power, monomer feed location inside the reactor, deposition time, and substrate size. X-ray reflectometry measurements provide information on the thickness, roughness, and scattering length density of films as deposited. The overall degree of swelling of a film in a good solvent vapor and the kinetics of swelling can be determined also with X-ray reflectometry, for films that are tens of nanometers in thickness. The overall cross-link density, which is an important structure characteristic, can be inferred from the degree of swelling.

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