

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Structure of Photonic Multilayer Films Created by Plasma Enhanced Chemical Vapor Deposition (PECVD) SOMESHWARA PERI, BRIAN HABERSBERGER, BULENT AKGUN, MARK FOSTER, Institute of Polymer Science, HAO JIANG, TIMOTHY BUNNING, Air Force Research laboratory, CHARLES MAJKRZAK, NIST Center for Neutron Research — The structures of copolymer films created by PECVD were studied for the first time using neutron reflectivity (NR) and x-ray reflectivity (XR). Both homopolymer films of benzene (PP-B) and octafluorocyclobutane (PP-OFCB) and copolymer films of HMDS and OFCB made using different feed ratios were considered. In HMDS-OFCB copolymer films, we observed a transient structure next to the substrate as seen previously for homopolymer OFCB films. PP-B films swelled approximately 200 % in deuterated-THF vapor and PP-OFCB swelled approximately for 30 % in deuterated-toluene vapor, indicating that for these processing conditions PP-B films are much less highly crosslinked than are PP-OFCB films. We have measured for the first time the variation in crosslink density with depth for homopolymer films created by PECVD.

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Date submitted: 28 Nov 2005

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