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Diffusion of polyelectrolyte chains within layer-by-layer films: effect of film stratification VICTOR SELIN, ALIAKSANDR ZHUK, Department of Chemistry, Chemical Biology and Biomedical Engineering,Stevens Institute of Technology, Hoboken, New Jersey 07030, JOHN F. ANKNER, Spallation Neutron Source, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831, USA, SVETLANA SUKHISHVILI, Department of Chemistry, Chemical Biology and Biomedical Engineering,Stevens Institute of Technology, Hoboken, New Jersey 07030 — We compare the molecular weight dependence of the diffusion of polyelectrolyte chains within polyelectrolyte multilayer films with a different degree of internal layer intermixing. Linearly and "exponentially" grown films were prepared by the layer-by-layer (LbL) technique using poly(methacrylic acid) (PMAA) as a polyanion and quaternized poly-2-(dimethylamino)ethyl methacrylate (QPDMAEMA) as a polycation. Diffusion of polyelectrolyte chains in directions parallel and perpendicular to the film surface was measured using fluorescence recovery after photobleaching (FRAP) and neutron reflectometry (NR), respectively. We find that in solutions of 0.2-0.4 M NaCl, lateral chain diffusion is enhanced in the exponential regime. More importantly, the scaling of the center-of-mass diffusion of polyelectrolyte chains with polymer molecular weight changed from a $D \sim M^{-1}$ dependence in the linear regime to a stronger dependence for the exponential regime, where polymer chains were stronger intermixed.

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