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Quantifying the molecular interactions between block copolymers and lipid bilayers WENJIA ZHANG, KAREN HAMAN, TIMOTHY LODGE, FRANK BATES, Univ of Minnesota - Twin Cities — Block copolymers have been widely used in cell membrane stabilization and permeabilization. Herein, we investigate the effect of polymer structure on molecular interactions between phospholipid unilamellar liposomes as model membranes and block copolymers comprising poly(ethylene oxide) and poly(propylene oxide) by varying the relative hydrophobic/hydrophilic composition, overall molecular weight and architecture of the polymer. Pulsed field gradient NMR (PFG-NMR) is employed to probe the diffusion of polymers in the presence of liposomes. The diffusion of the polymers associated with liposomes can be differentiated from that of free polymer coils based on their distinct diffusivities, thereby quantifying the association fraction of polymers. Increasing the hydrophobicity and overall molecular weight of the polymer significantly enhances the fraction of polymers associated with liposomes. These results demonstrate that PFG-NMR is a powerful tool to quantify the polymer-lipid bilayer association and bring new insights into the fundamental mechanism of the interactions between block copolymers and lipid bilayers.

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