Ultrathin Films of Amphiphilic Ionic Polyacetylenes

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Abstract

Thin films of amphiphilic ionic polyacetylenes based on poly (N-octadecyl-2-ethynylpyridinium bromide) were formed using the Langmuir-Blodgett and layer-by-layer deposition techniques. The surface pressure-molecular area isotherms of the monolayers of these polymers at the air-water interface indicate that the alkyl (octadecyl) chains of the repeating units are oriented perpendicularly to the water surface while the rigid conjugated polymer backbones are located within the planar layer of the interface. The molecular organization of transferred polymer multilayers has been also studied by FT-IR, ATR, GAR, and ellipsometry. As a result of this study, a model of the molecular organization of ultrathin films is proposed, in which the conjugated backbone chains of the polymer molecules are oriented parallel to the substrate and are sandwiched between layers of interdigitated octadecyl groups. The electrical conductivity of the polymer films was found to increase substantially upon doping with iodine. Enhanced gas permeability and permselectivity of membranes from Nafion were achieved by deposition of ultrathin films of the above polyacetylene on these membranes.