Amphiphilic Poly(vinyl alcohol) Membranes Leaving Out Chemical Cross-Linkers: Design, Synthesis, and Function of Tailor-Made Poly(vinyl alcohol)-b-poly(styrene) Copolymers

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

ID 4663288
Author(s) Angelini, Alessandro; Car, Anja; Dinu, Ionel Adrian; Leva, Luigi; Yave, Wilfredo
Author(s) at UniBasel Angelini, Alessandro ; Car, Anja ; Dinu, Ionel Adrian ;
Year 2023
Title Amphiphilic Poly(vinyl alcohol) Membranes Leaving Out Chemical Cross-Linkers: Design, Synthesis, and Function of Tailor-Made Poly(vinyl alcohol)-b-poly(styrene) Copolymers
Journal Macromolecular Rapid Communications
Volume 44
Number 16
Pages / **Article-Number** e2200875
Keywords block-copolymers, membranes, pervaporation, poly(vinyl alcohol), self-assembly
Mesh terms Polyvinyl Alcohol, chemistry; Micelles; Styrene; Polymers, chemistry; Water, chemistry
Tailor-made poly(vinyl alcohol)-b-poly(styrene) copolymers (PVA-b-PS) for separation membranes are synthesized by the combination of reversible-deactivation radical polymerization techniques. The special features of these di-block copolymers are the high molecular weight (>70 kDa), the high PVA content (>80 wt%), and the good film-forming property. They are soluble only in hot dimethyl sulfoxide, but by the “solvent-switch” technique, they self-assemble in aqueous media to form micelles. When the self-assembled micelles are cast on a porous substrate, thin-film membranes with higher water permeance than that of PVA homopolymer are obtained. Thus, by using these tailor-made PVA-b-PS copolymers, it is demonstrated that chemical cross-linkers and acid catalysts can no longer be needed to produce PVA membranes, since the PS nanodomains within the PVA matrix act as cross-linking points. Lastly, subsequent thermal annealing of the thin film enhances the membrane selectivity due to the improved microphase separation.
Publisher Wiley
ISSN/ISBN 1022-1336 ; 1521-3927
edoc-URL https://edoc.unibas.ch/93749/
Full Text on edoc Restricted;
Digital Object Identifier DOI 10.1002/marc.202200875
PubMed ID http://www.ncbi.nlm.nih.gov/pubmed/36628979
Document type (ISI) Journal Article