Blend membranes of polybenzimidazole and an anion exchange ionomer (FAA3) for alkaline water electrolysis: Improved alkaline stability and conductivity - DTU Orbit (17/11/2018)

Blend membranes of polybenzimidazole and an anion exchange ionomer (FAA3) for alkaline water electrolysis: Improved alkaline stability and conductivity

Anion exchange membranes (AEMs) conduct selectively hydroxide ions, while KOH doped polybenzimidazole is an ion-solvating polymer, conducting both potassium and hydroxide ions. In this work, meta-polybenzimidazole (mPBI) was blended with FAA3, a commercially available AEM, in the ratios of 2:1, 3:1, 4:1, 5:1 and 1:0. Doping was done by immersion in 0, 10, 15, 20, 25 and 30 wt% KOH solutions, giving rise to 30 membranes which were analyzed for their swelling behavior during doping, their composition (polymer, water, KOH), their mechanical properties and their through-plane conductivity in KOH solutions. Especially PF-41 showed higher tensile strength and Young’s modulus than mPBI under all tested KOH concentrations. The highest conductivity of 166 mS cm⁻¹ was observed for PF-51 doped in 25% KOH, 80% higher than for mPBI. In an alkaline stability test, blend membranes showed higher tensile strength, Young’s modulus and lower weight loss than mPBI after 4 weeks at 85 °C in 25 wt% KOH solution. PF-31 and PF-41 were also tested in an electrolysis cell, where they showed cell resistance comparable to mPBI. Because systems without cathode feed can be quite efficient, the permeability of membranes for KOH solutions was investigated.

General information
State: Published
Organisations: Department of Energy Conversion and Storage, Proton conductors, Korea Institute of Science and Technology, Saarland University
Pages: 653-662
Publication date: 2018
Peer-reviewed: Yes

Publication information
Journal: Journal of Membrane Science
Volume: 564
ISSN (Print): 0376-7388
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 6.93 SJR 2.4 SNIP 1.898
Web of Science (2017): Impact factor 6.578
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 6.13 SJR 2.087 SNIP 1.731
Web of Science (2016): Impact factor 6.035
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 5.89 SJR 1.978 SNIP 1.763
Web of Science (2015): Impact factor 5.557
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 5.42 SJR 2.436 SNIP 1.924
Web of Science (2014): Impact factor 5.056
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 5.38 SJR 2.451 SNIP 1.994
Web of Science (2013): Impact factor 4.908
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 4.37 SJR 2.185 SNIP 1.962
Web of Science (2012): Impact factor 4.093
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): CiteScore 4.29 SJR 1.823 SNIP 1.715
Web of Science (2011): Impact factor 3.85
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.807 SNIP 1.813
Web of Science (2010): Impact factor 3.673
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.635 SNIP 1.689
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.458 SNIP 1.789
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.434 SNIP 1.564
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.819 SNIP 2.441
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.748 SNIP 1.819
Scopus rating (2004): SJR 1.557 SNIP 1.668
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.488 SNIP 1.645
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 1.175 SNIP 1.842
Scopus rating (2001): SJR 1.296 SNIP 1.63
Scopus rating (2000): SJR 1.47 SNIP 1.71
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 1.381 SNIP 1.515
Original language: English
Keywords: Polybenzimidazole, Anion exchange membranes, Blend polymers, Alkaline electrolysis, Alkaline stability
DOIs:
10.1016/j.memsci.2018.07.074
Source: FindIt
Source-ID: 2438006890
Research output: Research - peer-review › Journal article – Annual report year: 2018