Polymer Electrolyte Membranes

Keywords: PEM fuel cells, PEM water electrolysis, SPPSU, Hybrid membrane

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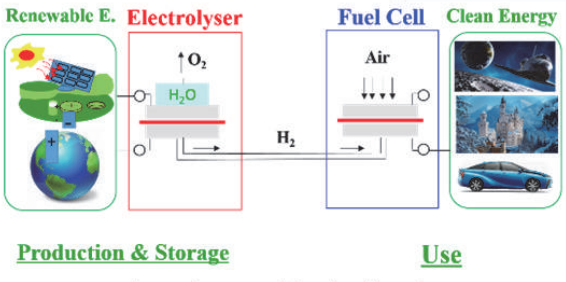
Background

- Building an energy society using a sustainable energy circulation system
- Polymer electrolyte membranes for energy generation and hydrogen production
- Polymer electrolyte membranes for energy storage and electrolysis separator

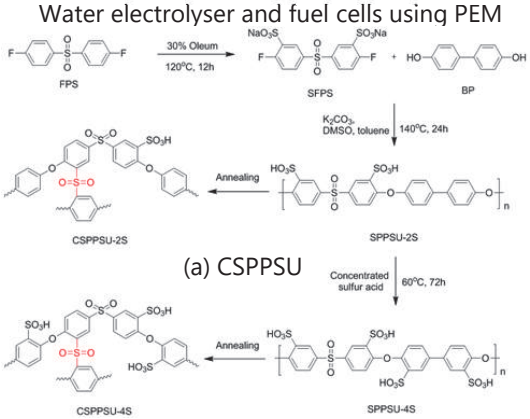
Aim

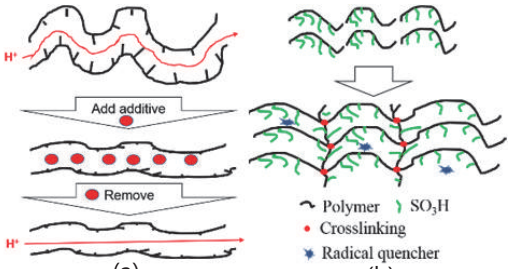
- Low cost polymer electrolyte materials
- High thermal and chemical polymer electrolyte membrane materials
- High proton conducting polymer electrolyte membranes

Advanced Research Topics

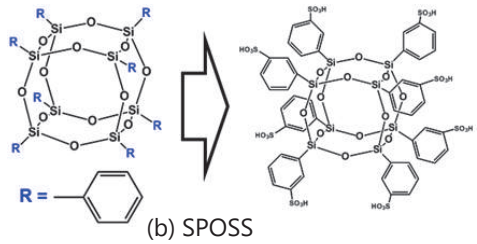


Water electrolyser and fuel cells using PEM





Schematic diagram for PEM design: (a) Conducting path control, (b) Crosslinking



Developed materials: (a) Crosslinked Sulfonated polyphenolsulfone (CSPPSU), (b) Sulfonated polyhedral oligomeric silsesquioxane (SPOSS)

Publications

- J.-D. Kim, et al., International Journal of Hydrogen Energy, 41, 11794-11800 (2016).
- Y. Zang, et al., Journal of Applied Polymer Science, 133, 44218-44225 (2016).
- S. Matsushita, et al., Solid State Ionics, 316, 102-109 (2018).

Applied area and future prospects

- PEM for fuel cells
- PEM for water electrolysis
- PEM for redox flow batteries
- PEM for electrolysis separation

Issues for technology transfer

- Sulfonation of polymer materials
- Crosslinking of sulfonated polymer materials
- Hybrid process of PEM materials
- Activation process of PEM