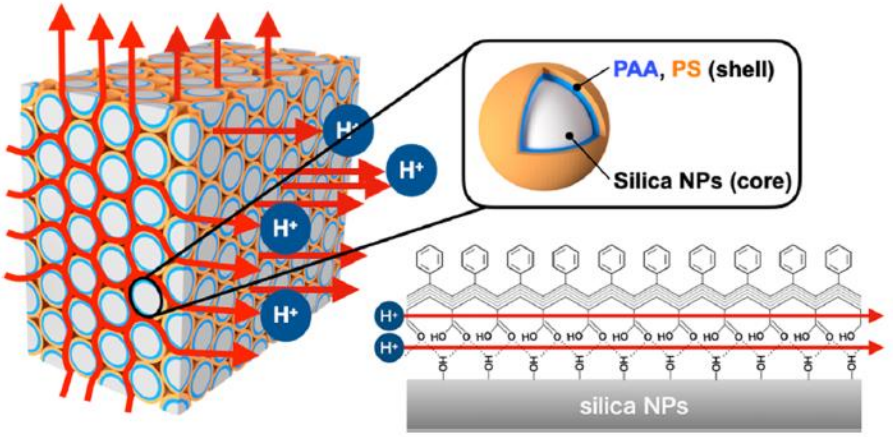
Tohoku Univ. Technology

High proton conductivity electrolysis with lower acidity than Nafion®

inexpensive catalyst is available instead of platinum



Overview

A perfluorocarbon material such as Nafion ® is widely used as a proton exchange membrane of a polymer electrolyte fuel cell (PEFC) used as a power source for a home and an automobile. However, such materials are difficult to use with catalysts other than platinum catalysts because of their extremely high acidity. This technology related to ion exchange membrane which has conductivity equal to Nafion ® and much lower acidity than its. This membrane is able to combine with inexpensive catalyst instead of platinum, and expected to reduce the cost of PEFC.

Conductivity of electrolysis contained polymer-modified silica or cellulose nanocrystal

[98%RH]×10^{-1}S/cm	60℃	50℃	40℃	30℃	20℃	Ea/eV
KE100@PAA-b-PS	0.0034	0.0020	0.0019			0.13
FR200@PAA-b-PS	0.0026	0.0002	0.0002			0.15
Pristine CNCs	0.0009	0.0007	0.0006	0.0005	0.0004	0.21
CNC@PVPA-free	2.9	2.9	2.7	2.5	2.3	0.08
CNC@PVPA-X1	4.9	4.9	4.4	4.3	3.8	0.08
CNC@PVPA-PS-free	0.18	0.15	0.15			0.12
CNC@PVPA-PS-X1	0.38	0.35	0.34	0.31	0.23	0.12

Product Application

- Proton exchange membrane for PEFC
- Water electrolysis membrane

Related Works

[1] ACS Sustainable Chem. Eng. 2020, 8, 14674-14678
[2] ACS Sustainable Chem. Eng. 2021, 9, 10093-10099

IP Data

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