

Team develops separator that reduces gas crossover for water electrolyzer

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Comparison of pore size distribution of separation membrane: KIER separation



membrane (Z75 ~ Z85), Commercial membrane (Zirfon). Credit: Korea Institute of Energy Research (KIER)

Dr. Won-chul Cho of the Hydrogen Research Department of the Korea Institute of Energy Research (President Jong-nam Kim) has developed a separator membrane that significantly reduces gas crossover while exhibiting high performance comparable to the commercial separator used with alkaline water electrolyzer process. The research has been published in the *International Journal of Energy Research*, the world's leading authority on nuclear power energy.

Water electrolysis is a technology for producing hydrogen and oxygen using electrochemical reactions. The technology has been actively conducted worldwide to control the peak load and frequency of power systems due to rapid expansion of renewable <u>energy</u> sources.

The commercial porous separator exhibits a satisfactory performance of high bubble point and low ionic resistance but high gas crossover, resulting in a limited dynamic range of the electrolyzer.

The researchers succeeded in developing a separator membrane with a reduced average pore size of around 70 nm and high surface wettability, contributing to helping alkaline electrolyzer systems be operated in more controllable loads.

The development of a separator with suppressed gas crossover while maintaining low ohmic resistance is mainly attributed to the homogeneous distribution of the hydrophilic zirconia particles over the polymer matrix.

Senior Researcher Won-chul Cho at Korea Institute of Energy Research



who is the main author of the paper said, "The membrane exhibits <u>high</u> <u>performance</u> and chemical stability and can be manufactured on a commercial scale. Therefore, it will soon be applicable to commercial electrolyzers."

The Hydrogen Research Department at Korea Institute of Energy Research is leading the main R&D projects for alkaline and PEM electrolyzers in Korea.



Comparison of the distribution results according to the thickness of (A) Zr (B) S (C) C on the surface of the separation membrane: KIER separation membrane (Z75, Z77), Commercial membrane (Zirfon). Credit: Korea Institute of Energy Research (KIER)

More information: Hae In Lee et al, The synthesis of a Zirfon-type porous separator with reduced gas crossover for alkaline electrolyzer, *International Journal of Energy Research* (2019). DOI: 10.1002/er.5038

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