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Tuning hydrophobic-hydrophilic balance of cathode catalyst layer to improve cell performance of proton exchange membrane fuel cell (PEMFC) by mixing polytetrafluoroethylene (PTFE)

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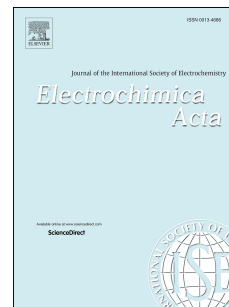
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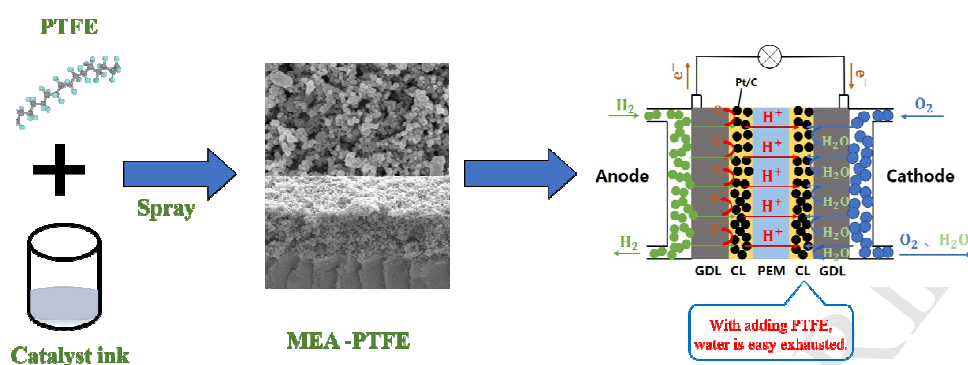
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Graphical abstract:



A series of MEAs with hydrophobic cathode catalyst layer was successfully prepared using a spraying method by adding PTFE into the cathode catalyst layer ink. Our optimal MEA, MEA-PT50, its current density were recorded as 990 mA cm^{-2} at 0.7 V and 1400 mA cm^{-2} at 0.6 V , respectively; its maximum power density is up to 856 mW cm^{-2} , which is much higher than that of the MEA without addition of PTFE (711 mW cm^{-2}). Furthermore, our MEA-PT50 also exhibits excellent stability, and the current density only dropped from 1000 mA cm^{-2} to 900 mA cm^{-2} after a continuous operation of 60 h, for the MEA without addition of PTFE, it dropped from 1000 mA cm^{-2} to 770 mA cm^{-2} in the same duration and same conditions.

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