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# Electrospun Nanofibre Composite Polymer Electrolyte Fuel Cell and Electrolysis Membranes

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## Abstract

Large-scale commercialisation of Proton Exchange Membrane Fuel Cell (PEMFC) technology for automotive and stationary applications demands the development of a robust, durable and cost-effective materials. In this regard, ionomer membranes being present at the core of PEMFCs are required to maintain elevated proton conductivity, high mechanical strength and low gas permeability during the lifespan of the fuel cell. These challenges are addressed by investigating novel nano-structured membrane materials possessing long-range spatial organisation of ionic and hydrophobic domains at the micro- and nano-scales. Electrospinning, a versatile and easily up-scalable tool for the preparation of nanofibrous polymers and ceramics with targeted architectures, is being extensively applied for the development of nanostructured electrolyte membranes. This review describes the most important advances in the use of electrospun materials for the preparation of new generation fuel cell proton conducting membranes. It also highlights the challenges to be overcome and the new directions and future application fields of composite nanofibre-based membranes in the broader context of energy materials.

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