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PROTON CONDUCTING FLUORINATED POLYMER NANOMEMBRANE FOR FUEL CELL APPLICATIONS

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Polymer electrolyte fuel cells (PEFC) gained a lot of interest in recent years as a potential solution for an eco-friendly energy. Proton exchange membranes (PEM) are one of the main components of PEFCs and require mechanical and chemical stability to ensure high proton conductivity and effective separation of anode and cathode under challenging conditions. Best commercial membranes made from sulfonated fluoropolymers, such as Nafion®, are rather expensive. To improve fuel cell performance at a lower cost, 2-acrylamido-2-methylpropane sulfonic acid (AMPS) was investigated recently.¹ As polyAMPS excessively swells or even dissolves in water, we investigated crosslinkable copolymers consisting of AMPS for proton conductivity, a perfluorinated acrylate (PFA) to mimic Nafion and glycidyl methacrylate for crosslinking. Since we combine very polar and very apolar monomers in the polymer chain we investigated the phase separation and orientation of proton conducting channels in the electrical field

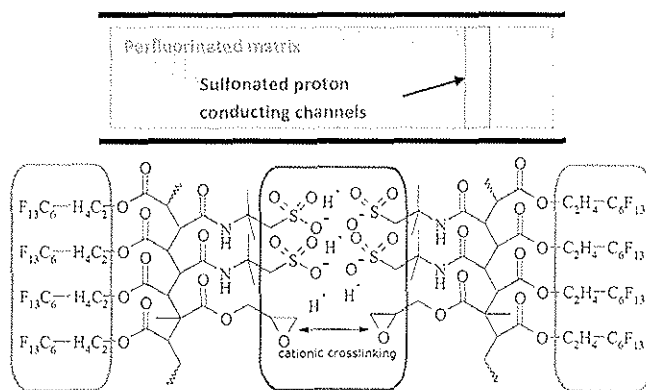


Figure 1: Phase separation of AMPS and PFA part in the polymer

First results of conductivity measurement and orientation will be presented.

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¹ Qiao, J., et al., *Journal of Materials Chemistry* 2005, 15 (41), 4414-4423.

Diao, H., et al., *Macromolecules* 43 (15), 6398-6405.