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Variable pressure NMR self-diffusion studies of fuel cell polymer electrolyte membrane¹ BRUNO PINTO, JAIME FARRINGTON, PHIL STALLWORTH, STEVE GREENBAUM, CUNY Hunter College, UNIVERSITY OF ROME COLLABORATION — The purpose of this study is to characterize water diffusion in polymer electrolyte membranes for hydrogen fuel cell applications under varying temperature and pressure. Measurement of the diffusion coefficient is accomplished by performing an NMR spin echo sequence in a large static magnetic field gradient. Variable pressure measurements allow the evaluation of the activation volume, which yields insight to the water mobility and proton conduction mechanism. Measurements were performed on NAFION ® samples containing different levels of nanoscopic tin dioxide (SnO₂) with water content of 10% and 25 % by mass. Results show that pressure has a larger effect on the sample with 10% water content, as demonstrated by a larger activation volume, than the 25% hydrated samples. This suggests that polymer segmental motion is involved in water molecular transport at lower water content. The effect of SnO₂ content on activation volume will also be presented.

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