Preparation and Characterization of Sulfonated Amorphous Carbon with Activated Carbon/Nafion Composite Membranes

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Nafion membranes are most commonly used as proton exchange membranes because they are excellent proton conductors and good electronic insulators, but they are expensive and require water for a high proton conductivity.
It was reported that sulfonated amorphous carbon is very useful as a proton exchange membrane because it excels in proton conductivity and thermal stability and can be produced at low cost. Some groups proposed an application in PEMFC as proton exchange membrane. Sulfonated amorphous carbon is prepared by heating carbon source in sulfuric acid and consists of small polycyclic aromatic carbon sheets with attached sulfonic acid group. In case of this process, we can obtain sulfonated carbon with a high sulfonate density.
In our study, we have prepared sulfonated amorphous carbon with activated carbon as water retainer and characterized our material by FT-IR, 13C MAS NMR, and SEM. We expect these materials have higher proton conductivity then commercial membranes under low and non-humidified conditions.