

Electronic Supplementary Information for

A new interpretation of SAXS peaks in sulfonated poly(ether ether ketone) (sPEEK) membranes for fuel cell

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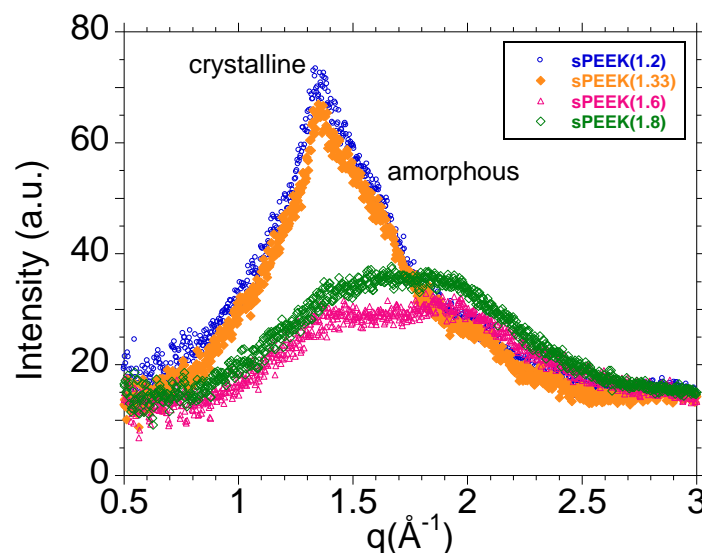
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Impact of the IEC on the crystallinity

The fact that a small-angle matrix peak can be observed for semi-crystalline membranes has been previously established for perfluorosulfonated ionomers^{1,2}.

The supporting information displays the WAXD spectra of sPEEK membranes for different IEC.



WAXD spectra of sPEEK(1.2)(○), sPEEK(1.33)(◇), sPEEK(1.6)(△), sPEEK(1.8)(◇) membranes in H⁺ form, after 96h of immersion at 80°C. The spectra were recorded in transmission geometry at room temperature and humidity.

The sPEEK(1.2) and (1.33) WAXD spectra clearly exhibit a sharp crystalline peak, located at about 1.37 Å⁻¹, this peak being superimposed to an amorphous halo centered around 1.6 Å⁻¹.

sPEEK membranes with similar degrees of sulfonation already showed crystallinity³. For sPEEK(1.6) and sPEEK(1.8), one can observe that the WAXD profiles broaden. The crystalline peak of sPEEK(1.6) is very weak, whereas only the amorphous halo remains for sPEEK(1.8).

References

1. Fujimura, M.; Hashimoto, T.; Kawai, H. *Macromolecules* 1981, 14, (5), 1309-1315.
2. Gebel, G.; Aldebert, P.; Pineri, M. *Macromolecules* 1987, 20, (6), 1425-1428.
3. Carbone, A.; Pedicini, R.; Portale, G.; Longo, A.; D'Ilario, L., *et al. Journal of Power Sources* 2006, 163, (1), 18-26.