Supporting Information

Novel Aromatic Polyelectrolytes via Polyacylation of Pre-sulfonated Monomer

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1. Spectrometric characterization

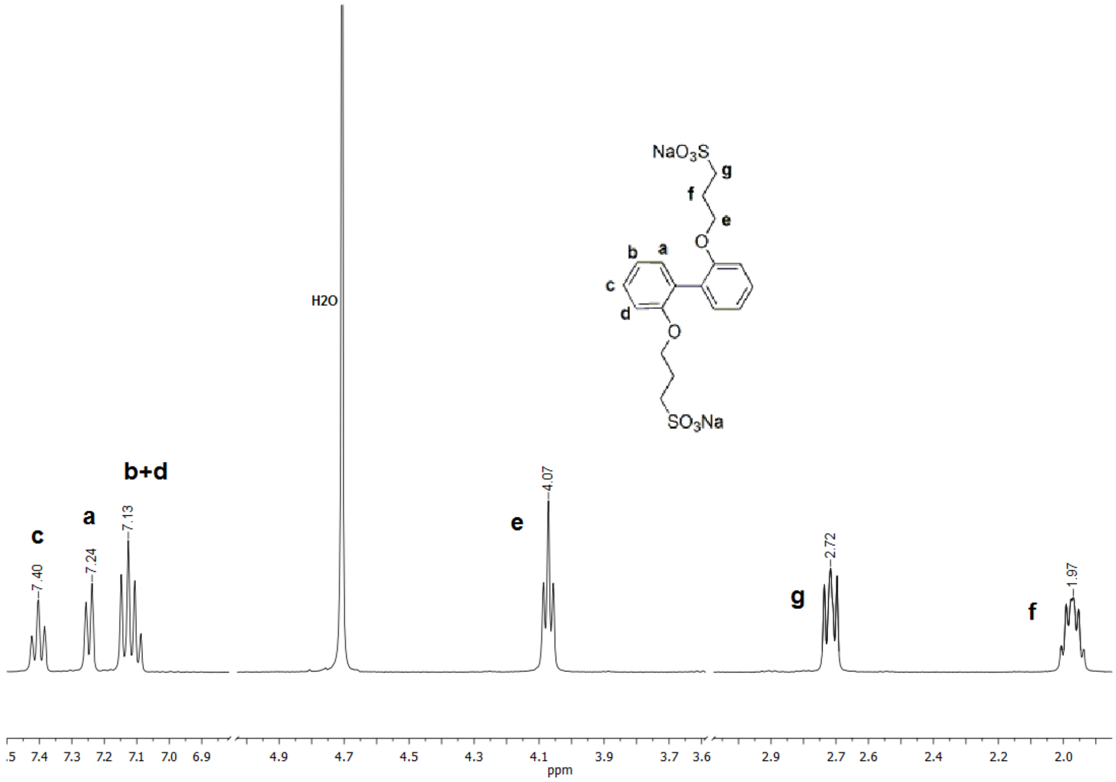
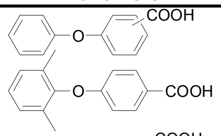
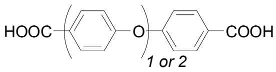
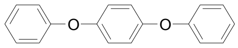
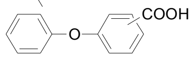
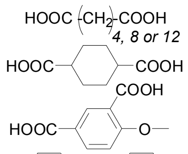
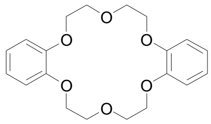
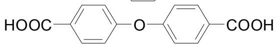
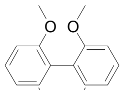
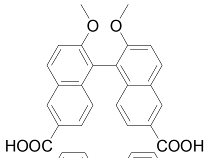
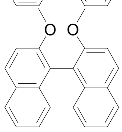
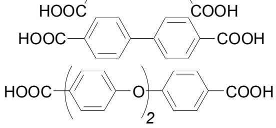
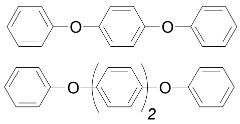
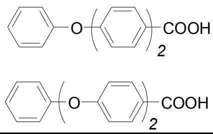


Figure S1. ^{1}H NMR spectrum of monomer SBP.

Table S1. A brief summary of monomers for polyacylation in acidic media reported in the literature.

Diacid monomers	Diarene monomers	Acid-arene monomers	Reaction media	References
-	-		P_2O_5/PPA	[1a]
			PPMA	[1b]
		-	PPMA	[1c]
		-	PPMA, TFSA	[1d]
		-	PPMA, TFSA	[1e]
			TFSA	[1f]

2. Preliminary single fuel cell performance

The MEA was prepared following the procedure reported in the literature.[2] The loading of Pt (20% Pt/C, HeSen Electric, China) was 0.40 mg cm^{-2} on both the anode and cathode electrode. The performance of the MEA with the active area of 12.25 cm^2 was measured using a 850e fuel cell test station (Scribner Associates, USA). The input flow rates of the anode H_2 and cathode O_2 were fixed at 200 cm^3/min and 400 cm^3/min, respectively. The cell temperature was controlled at 60 ^oC, and the humidification temperatures of the anode and cathode were controlled to achieve 100% relative humidity. Prior to recording the polarization curve, the MEA was activated by operating the test cell at open circuit voltage (OCV) for 1 h, followed by a potentiostatic discharge at 0.1 V and 0.5 V for 30 min respectively. Then, the polarization curve was recorded by linear sweeping of the potential from OCV to 0.35 V at a rate of 0.01 V/s.

As seen from Fig. S2, The peak power density of SCT-SAPs-1.0 was about 110 mW/cm^2, higher than that of Nafion 115 (about 90 mW/cm^2) under the same operation condition (H_2/air, 60 ^oC, 100% RH), showing promising application in PEMFC. On the other hand, these outputs were much lower than reported ones (usually hundreds of mW/cm^2), which we think may be mainly due to the use of domestic Pt/C catalyst instead of standard Johnson Matthey product and no hot-pressing of the MEA. Hence, there is a lot of work to optimize the whole system.

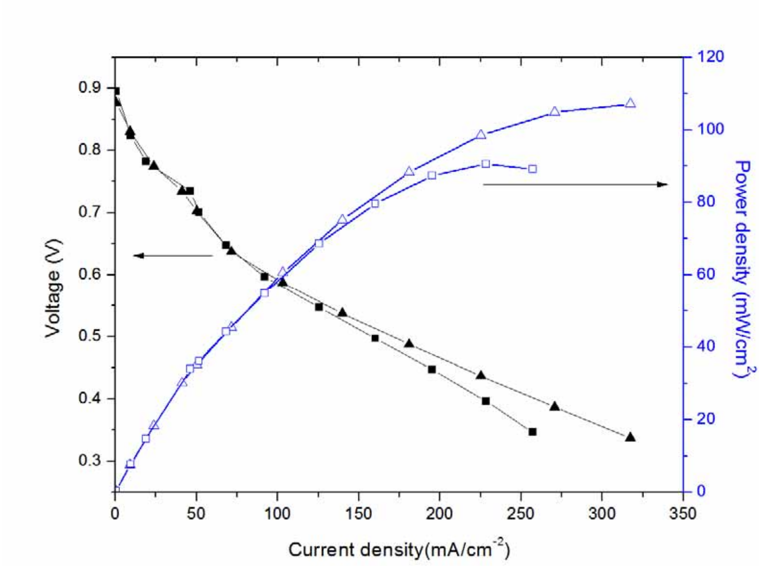


Figure S2. Single cell performance of current density-voltage curves (■ represents Nafion115, ▲ represents SCT-SAPs-1.0) and current density-power density curves (□ represents Nafion115, △ represents SCT-SAPs-1.0).

References:

[1] a) J.B. Baek, L.S. Tan, *Polymer* **2003**, *44*, 4135-4147; b) M. Ueda, M. Sato, *Macromolecules* **1987**, *20*, 2675; c) M. Ueda, T. Kano, T. Waragai, H. Sugita, *Makromol. Chem., Rapid Commun.* **1985**, 6, 847; d) N. Yonezawa, S. Miyata, T. Nakamura, S. Mori, Y. Ueha, R. Katakai, *Macromolecules* **1993**, *26*, 5262; e) A. Okamoto, R. Mitsui, K. Maeyama, H. Saito, H. Oike, Y. Murakami, N. Yonezawa, *React. Funct. Polym.* **2007**, *67*, 1243; f) H. M. Colquhoun, D. F. Lewis, *Polymer* **1988**, *29*, 1902.

[2] L. Wu, C. Huang, J. J. Woo, D. Wu, S. H. Yun, S. J. Seo, T. Xu, S. H. Moon, *J. Phys. Chem. B.* **2009**, *113*, 12265.