SUPPORTING INFORMATION TABLE: Characterization of the Water Content and the State of Water and the Proton Conductivity of Nafion 117 and Pore-filling Electrolyte Membranes

Membrane	filled polymer	Water content[(a)] [%]				λ[(b)] $[H_2O]/[SO_3H]$				proton conductivity[(c)] [S/cm]
		total	free	bound	unfreezable	total	free	Bound	unfreezable	
Nafion 117	-	37.0	5.3	17.0	14.7	22.8	3.2	10.5	9.1	0.080
PI-SPES-a	SPES-a	16.5	0	<0.1	16.5	12.6	0	< 0.1	12.6	0.001
PI-SPES-b	SPES-b	19.2	0	<0.1	19.2	9.7	0	< 0.1	9.7	0.002
PI-SPES-c	SPES-c	33.1	0	3.0	30.1	12.1	0	1.1	11.0	0.004
PI-SPES-d	SPES-d	48.7	0	9.9	38.8	14.6	0	3.0	11.6	0.007
PI-SPES-e	SPES-e	54.2	0	17.3	36.9	15.4	0	4.9	10.5	0.022
PI-SPES-f	SPES-f	47.6	0	17.7	29.9	10.5	0	3.9	6.6	0.033
PI-SPES-g	SPES-g	55.4	0	23.5	31.9	11.8	0	5.0	6.8	0.052

(a) The total water content was calculated from equation 3. The free, bound, and unfreezable water content were calculated from the water content (%) and the result of the DSC measurement. (b) The hydration number λ was calculated from the result of the DSC measurement. (c) 25 °C, fully hydrated condition.