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Supplementary information Figure 1 (a) Outlines of force testing setup for IPMC



Supplementary information Figure 1 (b) Testing setup for tip force response of KR-Ag-Pw based ionic actuator.

Supplementary information Table 1

Characteristic properties of Kraton MD9200 polymer based on Kraton Polymers Group of Companies data document catalogue number K00491dated October 2008 (<u>http://www.kraton.jp/products/pdf/NEXAR_MD9200_TDS.pdf</u>)

S. No.	Properties of	Mechanical properties as measured on		Water transport and uptake as measured on flat			
	solve	1 mil solution cast films		sheet solution cast films			
			Dry film:				
1.	Polymer content	10–12 %wt	Tensile strength @ yield		13 (1900) MPa (psi)	WVTR	20,000 g/day/m ²
2.	Volatile organic compound content	89±2 %wt	Strain @ yield		4%	Specify test condition	Inverted cup method @ 50% RH, 23°C, 1 mil film
3.	Flash point	-4°F (PMCC)	Tensile strength		9 MPa	Water uptake, weight gain in water	85 %
4.	Viscosity, at 20°C and 1-10 sec ⁻¹ shear rate	500-3,000 cP	Young's modulus		500 (72000) MPa (psi)	Film casting procedure	Commercial continuous solution casting process
5.	Specific gravity	0.78-0.8	Elongation @ break		83%	_	_
			Immersed in water:				
6.	Ion Exchange capacity	1.9–2.1 meq/g	Tensile strength	3 (435) MPa (psi)		_	_
7.			Modulus	28 (4100) MPa (psi)			
8.			Elongation	70%		_	_