Nanostructured electroactive polymer nanocomposites for large electromechanical actuation

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Nanostructured electroactive polymer nanocomposites have garnered attention as promising candidate materials for next generation compact electromechanical actuators, sensors, artificial muscles, owing to their attractive properties such as large electromechanical strain, fast response, high power to mass ratio, facile proccessibility, and affordability. In this presentation, we demonstrate that in the ionic polymer metal composite (IPMC) actuation, electroactive nanostructured polymer ionomers and their nanocomposites can provide an unexpected large actuation performance due to their structural feature such as the microphase-separated big-size ionic domains of the nanostructured polymers on the several tens nanometer scale. The electroactive nanostructured polymer nanocomposites can provide unexpectedly larger ion conductivity, larger air-working bending displacement and faster bending rate without conventional IPMC drawbacks, including back relaxation and a sacrifice of mechanical strength.

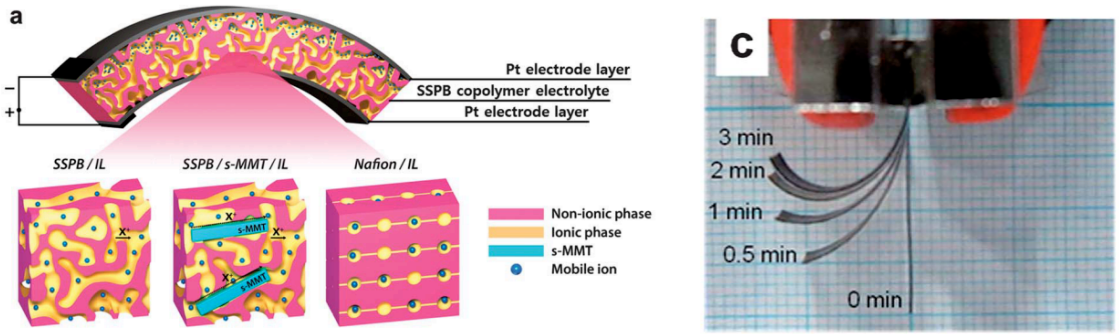

Figure 1 Nanostructured polymer nanocomposites and their electromechanical actuation.

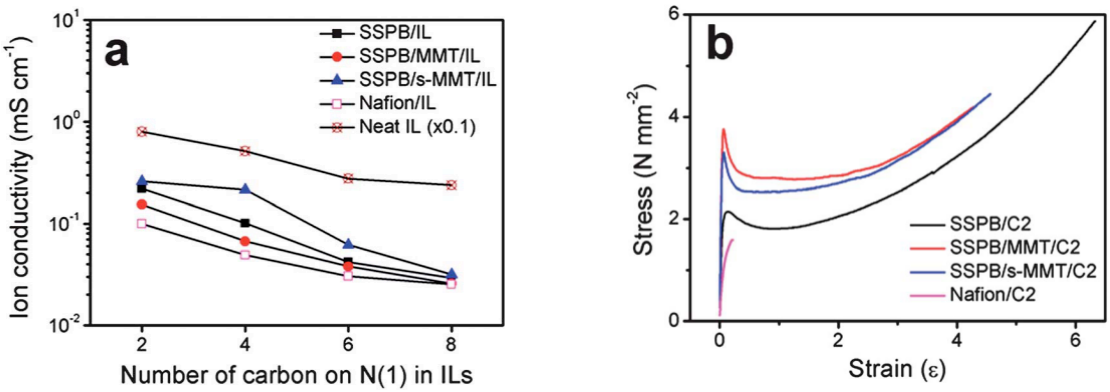

Figure 2 Ion conductivity and mechanical property of nanostructured polymer nanocomposites.

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[3] J. W. Lee, S. M. Hong, J. H. Kim and C. M. Koo, Sensors and Actutors B, 2013, **162**, 369.