Efficient Energy Conversion by Grafting Nanochannels with End-charged Stimuli-responsive Polyelectrolyte Brush GUANG CHEN, SIDDHARTHA DAS, Univ of Maryland-College Park — Polyelectrolyte (PE) brushes have aroused increasing attention in applications in energy conversion and chemical sensing due to the environmentally-responsive and designable nature. PE brushes are charged polymer chains densely grafted on solid-liquid interfaces. By designing copolymeric systems, one can localize the ionizable sites at the brush tip in order to get end-charged PE brushes. Such brushes demonstrate anomalous shrinking/swelling behaviors with tunable environmental parameters such as pH and salt concentration. In this study, we probe the conformation and electrostatics of such PE brush systems with various size, grafting density andcharge distribution, and exploit the electrochemomechanical energy conversion capabilities of nanochannels grafted with such PE brush systems. Our results indicate that the presence of the end-charged PE brush layer can massively enhance the streaming potential mediated energy conversion efficiency, and the improvement is more significant in strongly ionic solution.

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