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Streaming Potential and Energy Conversion in Nanochannel Grafted With Poly-Zwitterion Brushes[1] JAHIN PATWARY, University of Maryland, Baltimore County, GUANG CHEN, SIDDHARTHA DAS, University of Maryland — Here we study the streaming potential and electrochemomechanical energy conversion in nanochannels grafted with poly-zwitterion (PZ) brushes. PZs are polymer molecules consisting of negative and positive charge centres simultaneously; depending on the bulk pH, the extent of dissociation differs at each of these charge centres, yielding a particular net charge on the PZ molecule. This PZ charge, therefore, develops a pH dependent electrostatics of the PZ brushes grafted at the naochannel walls. We develop a self-consistent field theory model to calculate this electrostatics by appropriately accounting for the explicit hydrogen ion concentration. Secondly, we use this electrostatics to calculate the streaming potential and the resulting electrochemomechanical energy conversion in nanochannels grafted with poly-zwitterion (PZ) brushes. Our results indicate distinct influences of pH, bulk ion concentration, and the ionization parameters of the PZs in regulating the nanochannel energy conversion.

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