

High-Speed, Iontronic Polymer Actuator for Artificial Soft Muscles

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With the development of soft electronics, ionic polymer actuator has been regarded as a promising candidate due to low operational voltage and mechanical flexibility. However, artificial muscles based on ionic polymer suffer from low displacement and force at high operating frequencies. In this talk, we describe a high-speed, iontronic polymer actuator for artificial soft muscle by using ionic polymer and conducting polymer(PEDOT:PSS) solution with ionic liquid and DMSO as additives. Also, our actuator could control an interface structure from nano to micro size between ionic polymer and electrodes. As a result, through control of the interface structure, our actuator was successfully operated with a large displacement up to 2.5mm at an operating frequency of 20mHz under an applied voltage of 2V. Further, the actuator shows larger blocking force of 0.4mN at operating frequency of 1Hz. We expect to our actuator will be an effective way to implement a novel engineering design for artificial muscle capable of physiologically actuating under electrical stimuli.