

SENSING HUMAN PULSE-RATE USING IONIC POLYMER METAL COMPOSITE (IPMC)

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The interest in Bio-Inspired Engineering is triggered by innovations “inspired by nature”, but imaginative by necessity. In pursuance of such activities several new kind of materials have evolved, which are having several functions in itself as a sensor and actuator. Moreover, their capabilities and applications are further augmented by bio-inspired technologies, which is expected to bring about completely different ways people and machines interact with the physical world. In this context use of Ionic Polymer-Metal Composites (IPMCs) appears to be attractive for its: facile fabrication, high mechanical flexibility, light weight, customizable electromechanical coupling properties and tailorable geometries. An IPMC consists of a polyelectrolyte membrane containing ions with a solvent and metal electrodes plated on both surfaces of the membrane. Development of smart material using ionic polymer-metal composites (IPMCs)

is of abiding importance. The IPMCs are now recognized to have potential applications in developing bio-mimetic sensors, actuators, transducers, and artificial muscles. We have been engaged in developing IPMC based actuators and sensors. Recently we have reported results of the actuation and sensing studies of a five-fingered miniaturized robotic hand fabricated by using IPMC. Very recently, we have explored the possibility of using Nafion based IPMC as a soft wearable sensor for human pulse-rate extraction. In this talk the concept of a novel pulse rate sensing device is introduced exhibiting the proof-of-principle of the mechano-electrical functions of the device, namely IPMC film prepared by surface platinization of the ionic-polymer film. Such work stimulates further research towards development technologies that have far reaching application consequences in biomedical engineering.

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