



## Smart Materials and Structures

# Ionic polymer-metal composites: I. Fundamentals

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## Abstract

This paper, the first in a series of four review papers, presents a brief summary of the fundamental properties and characteristics of ionic polymeric-metal composites (IPMCs) as biomimetic sensors, actuators and artificial muscles. The forthcoming three review papers, to follow this paper, will address in detail such fundamentals and, in particular, manufacturing techniques and the electronic and electromechanical characteristics of IPMCs (part II), the phenomenological modelling of the underlying sensing and actuation mechanisms in IPMCs (part III) and the potential application areas for IPMCs (part IV). This paper is a summary of all recent findings and current state-of-the art manufacturing techniques, phenomenological laws and mechanical and electrical characteristics. A number of methodologies in developing high-force-density IPMCs are also reported.

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