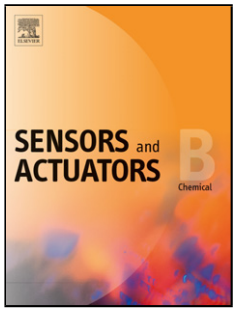

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Polyaniline Based Microtubes as Building-Blocks for Artificial Muscle Applications

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Highlights

- Fabrication of a new actuator configuration based on polyaniline/gold microtubes.
- The actuator bends by switching the potential between -0.2 and 1 V, even when simulated gastric fluid was used as electrolyte.
- The charge transfer resistance and diffusion coefficients vary with the applied potential.

Abstract

Morphology is a key element in the functionality of low dimensional structures including here electroactive polymers, especially when applications such as muscle like actuators are sought. The reason is that morphology in the context of a high specific surface object strongly influences specific parameters such as ionic diffusion, conductivity and consequently the actuation capability of the system. In the present work a new architecture for microtube-based actuating elements is presented. Free-standing fibrillar microtubes with diameter in the range of micrometers and with a core–shell polyaniline/gold structure are fabricated through a scalable approach. Aligned electrospun poly(methyl methacrylate) fibers are coated with gold and are further employed as microstructured electrodes for the electrochemical deposition of polyaniline. Further the poly(methyl methacrylate) core was dissolved, leading to a tubular structure. The polyaniline/gold