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Magnetoactive elastomer/PVDF composite film based magnetically controllable actuator with real-time deformation feedback property

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Abstract

This work reported a high performance flexible magnetically controllable actuator based on magnetoactive elastomer (MAE) and poly (vinylidene fluoride) (PVDF) composite film. The magnetic-mechanic-electric coupling properties of the actuator were systematically investigated by cyclical wrinkle, magnetic bending, and stretching test. The induced charge under a magnetic bending can reach as large as 158 pC even at small magnetic field of 100 mT with the bending angle up to almost 90 degrees within 0.6 s. Moreover, a new model was proposed to theoretically reveal the intrinsic correspondence. The model matches well with the experimental results. Based on this kind of actuator, a magnetically controllable tentacle is developed, which could grasp, transport, and release object by switching the supplied current. Due to the real-time deformation feedback characteristics, this kind of actuators can find wide applications in actively controllable engineering, artificial robotics, and biomedicine.

Keywords: A. Polymer-matrix composites (PMCs), A. Smart materials, B. Magnetic properties, B. Mechanical properties, Magnetoactive elastomer

1. Introduction

Intelligent soft active materials are of enticing prospect for the realization of specific

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