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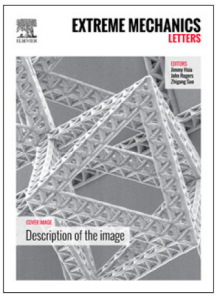

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Bio-inspired Soft Robotics: Material Selection, Actuation, and Design

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Morphology
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Loss Modulus
Energy Density

ABSTRACT

Animals exploit the deformability of soft structures to move efficiently in complex natural environments. These soft structures are inherently compliant and enable large strains in components not typically found in robotics. Such capabilities have inspired robotic engineers to incorporate soft technologies into their designs. One goal in soft robotics is to endow robots with new, bioinspired features that permit morphologically adaptive interactions with unpredictable environments. Here, we review three key elements of bioinspired soft robots from a mechanics vantage point, namely, materials selection, actuation, and design. Soft materials are necessary for safe interaction and overall actuation of bio-inspired robots. The intrinsic properties of materials in soft robots allow for an "embodied intelligence" that can potentially reduce the mechanical and algorithmic complexity in ways not possible with rigid-bodied robots**.** Finally, soft robotics can be combined with tissue engineering and synthetic biology to create bio-hybrid systems with unique sensing, dynamic response, and mobility. Bioinspired soft robots have the ability to also expedite the evolution of co-robots that can safely interact with humans.

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