Pre-strain in Dielectric Elastomer Actuator; Challenges towards Structure-Property Relationship

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Pre-strain is one of the most preferred techniques to enhance electromechanical performance of dielectric elastomer actuators (DEA). However perfect strain regime and deformation conditions toward efficient mechanical output are yet to be recognized and the relation with micro/macromolecular parameter perceive relevant attention. This article collects recent studies on the influences of pre-strain on electroactive behaviour of dielectric elastomer. Strain regulated electromechanical properties are discussed in respect to modification in micro/ macromolecular structures. Molecular modification due to strain hardening in biaxially pre-strained VHB 4910 dielectric elastomer is evidenced. Hardening may lead crystallization which is a probable reason that control dielectric and elastic characteristics. The results address well the significance of requisite development towards structural-property relation, as a promising understating to improve actuation performance of elastomer based soft actuator.

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