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Functionalized Ultra-Soft Rubber for Soft Robotics Application

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Abstract : Recently, the growing need for the development of soft robots consisting of highly deformable and compliance materials emerge from the serious limitations of conventional service robots. However, one of the main challenges of soft robotics is to develop such compliance materials, which facilitates the design of soft robotic structures and, simultaneously, controls the soft-body systems, like soft artificial muscles. Generally, silicone or acrylic-based elastomer composites are used for soft robotics. However, mechanical performance and long-term reliabilities of the functional parts (sensors, actuators, main body) of the robot made from these composite materials are inferior. This work will present the development and characterization of robust super-soft programmable elastomeric materials from crosslinked natural rubber that can serve as touch and strain sensors for soft robotic arms with very high elastic properties and strain, while the modulus is altered in the kilopascal range. Our results suggest that such soft natural programmable elastomers can be promising materials and can replace conventional silicone-based elastomer for soft robotics applications.

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