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Highly Stretchable and Tough Self-healing Elastomer for Electronic Skin

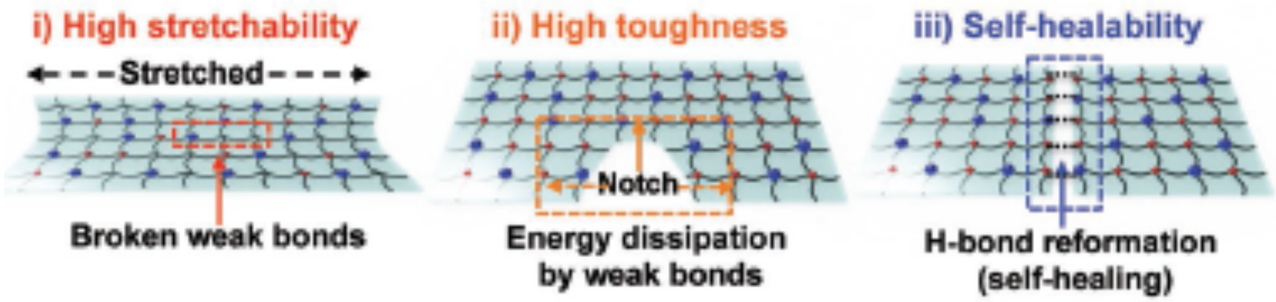
Published date: May 23, 2019

Technology description

Development of highly stretchable and tough self-healing elastomer and its application for robust electronic skin

Stanford researchers at the Bao Lab have designed and fabricated a highly stretchable, tough, and self-healable material with high fatigue resistance applicable for electronic (e-) skin devices. This silicone polymer material supramolecularly cross-links through multi-strength hydrogen bonding interactions. Remarkably, the healing can even take place in water at room temperature. The self-healable supramolecular network realizes a high fracture energy (~12,000 J/m^2) and notch-insensitive stretching up to 1200%. It is readily moldable and stackable into stretchable 3D object shapes. This simple polymer design concept allows a broad range of mechanical property tuning desirable for targeted applications.Figure

A)



B)

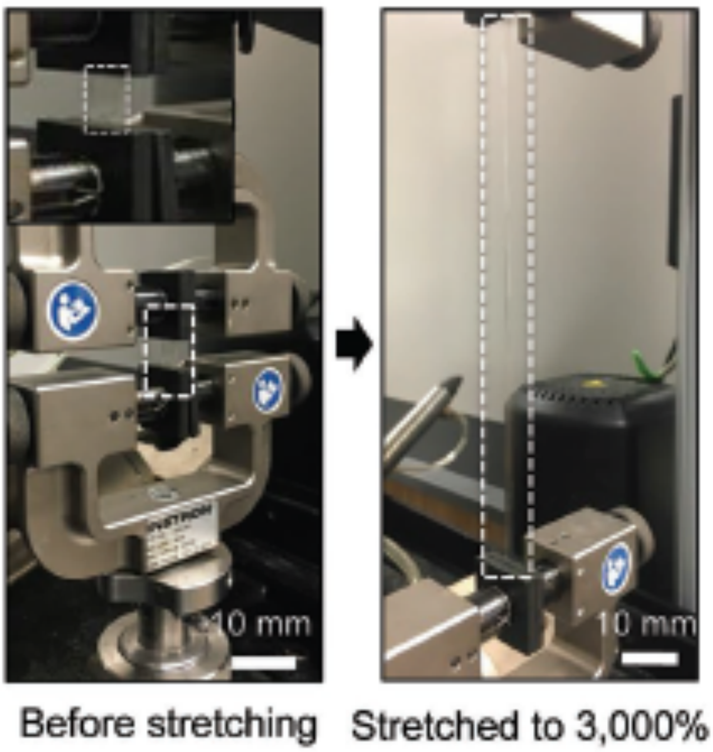


Figure description -Figure A. Schematics of a stretched polymer film (left), notched film (middle), and healed film (right). Figure B. The film before stretching (left) and showing high stretchability at 3000% stretching (right) in Instron machine

Application area

Self-healing dielectric layer Self-healing substrate for electronic devices End user applications include: wearable devices, biomedical devices, and electronic displays

Advantages

High stretchability High fracture toughness Autonomous self-healing, including underwater self-healing Transparent Tunable mechanical properties Easily processable Scalable

Institution

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