Intrinsically healable, stretchable and conductive poly(3-hexylthiophene) graft copolymers

Paul Baek
Nihan Aydemir, Yiran An, Eddie Wai Chi Chan, Anna Sokolova, Duncan McGillivray, David Barker, and Jadranka Travas-Sejdic

Electronic materials that can stretch and heal without loss of their electronic function are key elements for stretchable electronics. The majority of organic materials, such as conjugated polymers, can be engineered to be flexible but are not inherently stretchable. Herein, a unique molecular approach to intrinsically stretchable and healable conjugated polymers is reported for the first time. The simple yet versatile synthetic procedure allows one to fine-tune the electrical and mechanical properties without disrupting the electronic properties of poly(3-hexylthiophene) (P3HT). The designed material is comprised of hydrogen-bonding graft copolymer with P3HT backbone. The morphological changes affected by the composition of insulating side chains, as well as the solvent quality of the casting solution, play a crucial role in leading to highly stretchable and room temperature healable conductive electronic materials. The newly developed technique towards functionalization of conjugated polymers is suitable for fabricating a broad range of stretchable organic electronics.[1]

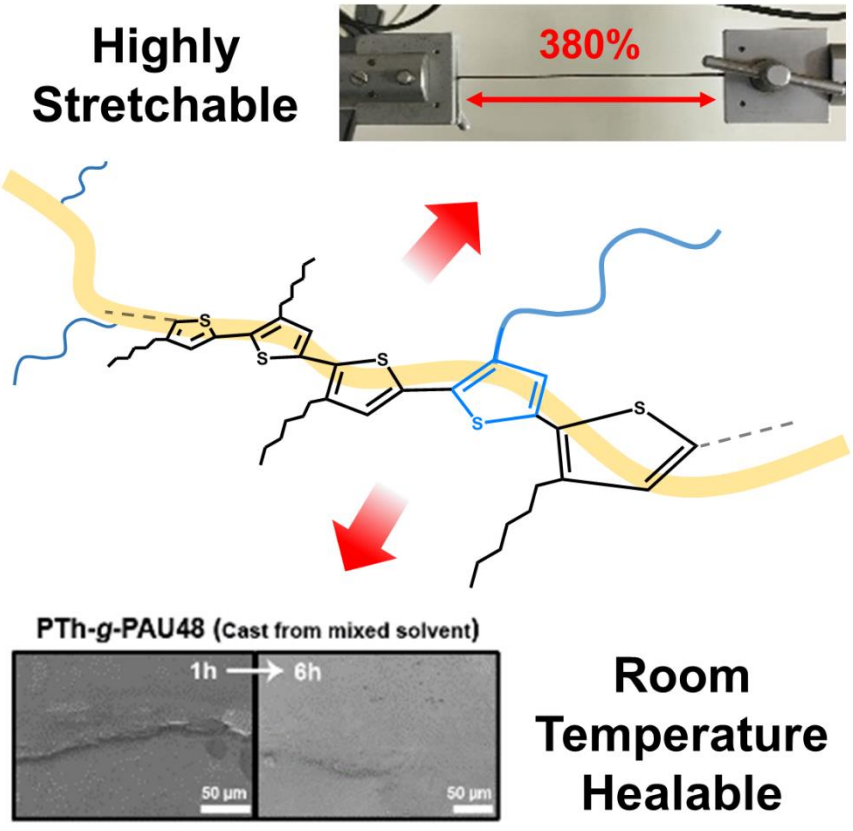

Figure 1. Schematic diagram of intrinsically stretchable and healable conjugated polymer with grafted functional side chains (shown in blue).

1. Baek et al. *Adv. Func. Mat.*, **2017**, Submitted