Ultra-stretchable, Highly Sensitive, Non-volatile Ionoskins for Ionic Wearable Sensors

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The primary technology of next-generation wearable electronics pursues the development of highly deformable and stable systems. Here, nonvolatile, highly transparent, and ultra-stretchable ionic conductors based on polymeric gelators [poly(methyl methacrylate-ran-butyl acrylate), PMMA-r-PBA] and ionic liquids (IL) are proposed. A crucial strategy in the molecular design of polymer gelators is copolymerization of PMMA and IL-insoluble low glass transition temperature (Tg) polymers that can be deformed and effectively dissipate applied strains. Highly stretchable, mechanically robust, and deformation durable (recovery ratio≈96.1%) gels are obtained by judiciously adjusting the molecular characteristics of polymer gelators and gel composition. An extremely simple ionic strain sensory platform is fabricated by directly connecting the stretchable gel and a digital multimeter, exhibiting high sensitivity (GF ≈2.73), stable operation (>13 000 cycles), and nonvolatility. Moreover, the skin-type strain sensor, ionoskin, is demonstrated. The ionoskin renders the opportunity to achieve wearable ubiquitous electronics such as healthcare devices and smart electronics.