

Name	Job Title	Area of Expertise
MURAKAMI Hiroto	Professor	Polymer Chemistry, Supramolecule
1. Main Research Topics ① Development of Functional Polyurethane Elastomer (Fig. 1) We focus on establishing a synthesis method for a novel polyurethane crosslinked by polyrotaxane and investigating their various properties such as thermal, viscoelastic, and mechanical properties. The crosslinking points in polyurethane significantly influence its elastomeric properties. Meanwhile, the polyrotaxane has a topological structure where multiple ring molecules are mechanically interlocked by a linear polymer axis. These ring molecules can freely translate and rotate along the axis polymer. We expect that the unique characteristic of polyrotaxane plays important roles to create polyurethanes with excellent vibration isolation, self-healing, and cushioning properties. ② Development of Easily Peelable Pressure Sensitive Adhesive (Fig. 2) In the technical development of adhesives, achieving both high adhesiveness and easy peelability is a crucial challenge. Furthermore, recyclability is also important from an environmental conservation perspective. Therefore, we are developing adhesives that are easily peelable using heat as a trigger and are reusable. ③ Development of Electrochromic Devices with Nonvolatile Solvents (Fig. 3) To suppress damage to electrochromic (EC) devices, which can be caused by solvent evaporation, degradation of EC materials and counter electrode compensation materials, or physical cracks, we utilize viologen (V)-type ionic liquids as EC materials and ferrocene (Fc)-type ionic liquids as counter electrode compensation materials. We expect that liquefying these materials will not only resolve these issues but also allow for a higher concentration of EC substances, leading to the possibility of thinner EC devices and faster response times.		
2. Keywords Polyurethane, Pressure Sensitive Adhesive, Photochromic, Ionic Liquid		
3. Remarks and Websites researchmap: https://researchmap.jp/hmrm090310051105 Laboratory: https://www.cms.nagasaki-u.ac.jp/lab/douteki/jp/index.html Research ①: We have successfully developed highly extensible polyurethane elastomers. Our goal is to continue developing diverse functional polyurethane elastomers, not limited to polyrotaxane-based materials. Research ②: In collaboration with industry partners, we're developing easily peelable acrylic and silicone adhesives. Research ③: We have achieved multi-color electrochromism and are exploring applications for display devices like electronic paper. For more information, please feel free to get in touch.		

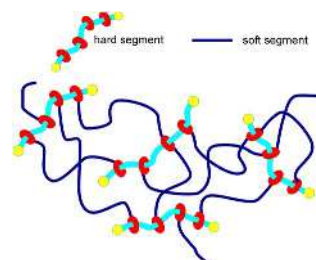


Figure 1. Cartoon of polyurethane crosslinked by polyrotaxane.

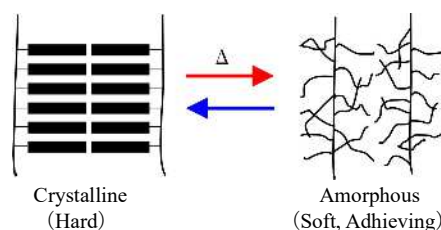


Figure 2. Mechanism of Easily peelable using heat as a trigger.



Figure 3. An electrochromic device constructed by a mixture of ferroceneion and viologen ionic liquids.