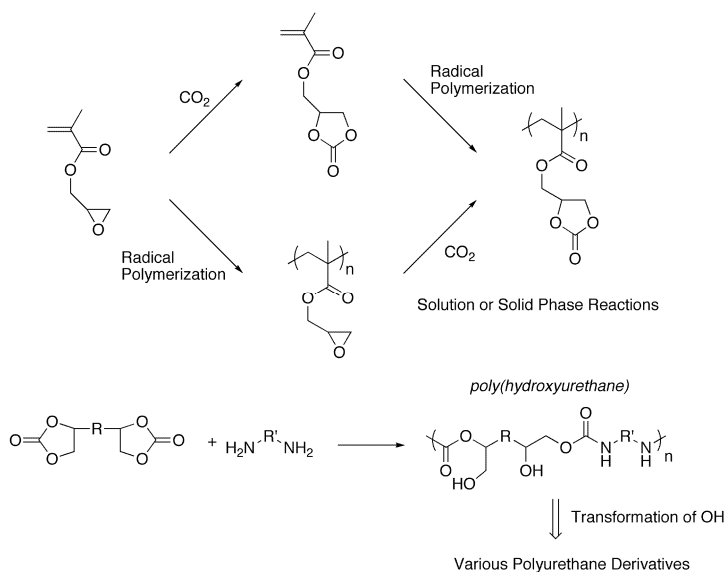


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Group Homepage	http://ochiai.yz.yamagata-u.ac.jp/index-e.html
Main Subjects	<ol style="list-style-type: none"> 1. Synthesis of polymers from carbon dioxide, carbon disulfide, and naturally occurring compounds. 2. Cyclopolymerization through large ring formation 3. Synthesis of polymeric hosts for metal and chiral compounds.

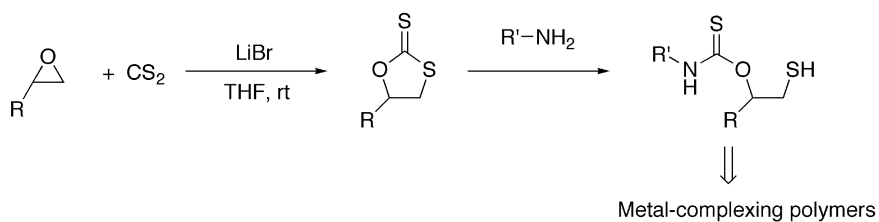
Content

Our research interests are facile synthesis of polymeric materials from abundant non-fossil resources, e.g., CO₂, CS₂, and terpenes.

For conversion of carbon dioxide through low-energy cost, we choose the reaction of carbon dioxide and epoxides to produce five-membered cyclic carbonates. This reaction proceeds at moderate temperatures under atmospheric pressure. The resulting five-membered cyclic carbonates can be either the components or the raw materials of polymers. The radical polymerization of glycidyl methacrylate under CO₂ atmosphere affords polymers bearing carbonate structure via the concomitant CO₂ fixation with polymerization. As the raw materials, we are developing the polyaddition of bifunctional five-membered cyclic carbonates with diamines that produces polyurethane derivatives without using isocyanates.



CS₂ is prepared from charcoal and sulfur, which are abundant resources. The reaction of CS₂ with epoxides gives five-membered cyclic dithiocarbonates. Their reaction with amines affords thiourethanes with thiol moieties. Applying this reaction to multi-functional analogues is a good strategy to prepare multi-functional thiols, which are too unstable for commercial products. For example, we prepared graft copolymers via facile methods using polymers with thiol moieties via simple polyaddition. We are also exploring the metal complexing abilities of these products. Utilizing this conversion of the reaction mode from nucleophilic to radical one, we attained the first atom-economic and sequence controlled polyaddition of three monomers.



We are also exploring unique polymerization systems depending on highly chemo-selective reactions. We attained controlled cyclopolymerization through large-ring formation (> 10), and selective polymerizations of naturally occurring compounds such as kojic acid derivatives.

