

## Sequence-Controlled Polymers via Chain-Growth Polymerization

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Copolymers that are synthesized via radical copolymerization have been employed for materials because the properties can be tuned through the combination of comonomers bearing various pendant groups. On the other hand, peptides are also copolymers that are produced from 20 kinds of amino acid as comonomers. Their functions are more advanced than synthetic copolymers and the difference between the two lies in control of the order of repeating units or sequence. Thus, sequence-controlled polymers have recently attracted attentions among polymer chemists.<sup>1)</sup> Our interest is directed to sequence control for the artificial copolymers consisting of vinyl monomer-based repeating units<sup>2)</sup> to find sequence-oriented properties and functions (Figure 1). However, the mechanism of chain-growth polymerization is unsuitable for sequence regulation or control of propagation order for some comonomers.

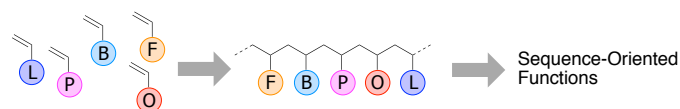


Figure 1. Sequence control for vinyl polymers

We have uniquely developed methodologies to control sequence for vinyl polymers: iterative cyclization,<sup>3)</sup> cyclopolymerization,<sup>4-6)</sup> iterative addition<sup>7)</sup> (Figure 2). Herein, crucial is an introduction of special covalent bond into monomers and/or initiator, such as cleavable, renewable, and transformable bonds. They allow introduction of functional groups as well as iterative cycles along with propagation on the basis of the chain-growth mechanism.

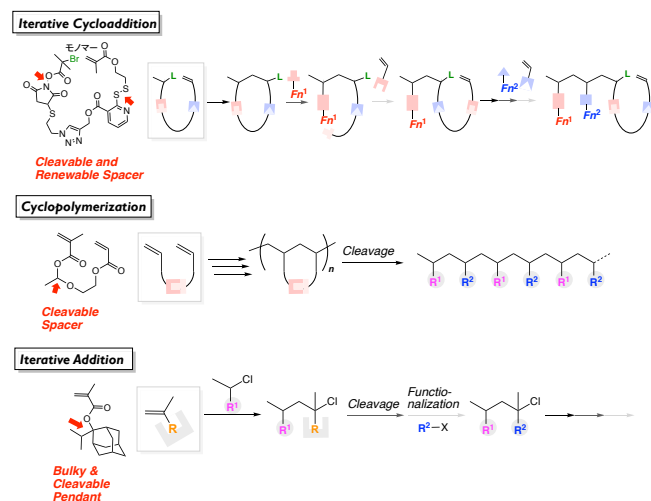


Figure 2. Methodologies to approach sequence control

### References

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