

화학고 세미나

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Applying New Synthetic Methodologies to Versatile Polymerizations and Self-Assembly Process

Olefin metathesis provides a versatile synthetic method to produce small, medium and large molecules. Over the past two decades, wide ranges of the molecules have been prepared by various types of olefin metathesis from various alkenes. Ru-based Grubbs catalysts have popularized the reaction because the catalysts are not just highly active but also very easy to handle with good functional group tolerance. Now the metathesis polymerization of alkene monomers is one of the most common ways to construct polymer architectures and nanostructures. On the other hand, only a few study reported the polymerization of alkyne-containing molecules although alkynes are highly versatile functional groups in synthetic chemistry. Here, we describe two new polymerisation strategies using alkynes

Firstly, we studied the cyclopolymerization of 1,6-heptadiyne derivatives using Grubbs catalysts to produce soluble and processable polyacetylenes. We will discuss about a story of how we achieved living cyclopolymerization to control molecular weight and narrow dispersity. Secondly, we recently developed a novel method for preparing fully conjugated polyenyne by combining olefin metathesis and metallotropic 1,3-shift reactions (M&M polymerization). This method allowed for very unique specific-sequence of cascade reaction by using Grubbs catalyst. Rational design of monomers enabled living polymerization of various multi-alkynes.

With these polymerizations in hand, we extended our studies to prepare novel nanostructures. We will demonstrate that cyclopolymerization and M&M polymerization gave conjugated polymers that readily undergoes self-assembly to semiconducting 1D and 2D nanoparticles. We were able to obtain AFM and TEM images and also conducted some diffraction studies to elucidate the tentative packing model for these unique nanostructures. We will describe the story of how we were able to control the shape or the sizes of these nanostructures.

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Location : 과학관 B101호

Host : 연세대학교 화학과