

Stereoselective Cationic Polymerization of Cycloaliphatic Vinyl Ethers

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Abstract:

The stereoselective polymerization of isotactic polyvinyl ethers (iPVEs) presents an exciting avenue for the development of renewable and sustainable polymers with thermomechanical properties rivaling that of petrochemically-derived polymers such as polypropylene. In this project, non-stereoselective triflic acid catalyst was used as a control in the polymerization of various cycloaliphatic vinyl ether monomers. The resultant polymers were fully atactic with % m ranging from 50-70%, as expected for a non-stereoselective catalyst. On the other hand, when polymerized with the stereoselective Brønsted acid catalyst IDPi (imidodiphosphorimidate), the polyvinyl ethers reached near-full tacticity and were measured to have excellent thermomechanical properties¹. Thus, the polymerization of cycloaliphatic vinyl ethers with triflic acid serves to illustrate the ability of IDPi to control tacticity in polyvinyl ethers with a wide range of substituents. Not only this, IDPi is metal-free (vs. previously studied stereoselective ligated Titanium Lewis acid catalysts), works efficiently in milder reaction conditions, and can be derived from relatively inexpensive feedstocks. Future work can explore post-polymerization functionalization and the use of other monomers, making this research area promising for the development of new and exciting polymeric materials.

References:

Knutson *et. al.* *Brønsted acid catalyzed stereoselective ... J. Am. Chem. Soc.* ACS Publications.

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