

## Side-chain engineering in frontal ring-opening metathesis polymerization

Kevin A. Stewart – University of Utah

Frontal ring-opening metathesis polymerization (FROMP) is a thermally autonomous polymerization method in which a localized reaction front propagates through monomer via self-sustained thermal runaway, enabling rapid and energy-efficient polymeric material synthesis. While control over FROMP has traditionally emphasized catalyst selection and bulk thermodynamics, the role of monomer side-chain architecture in governing front behavior and material performance remains largely underexplored. This work presents recent advances showing how side-chain engineering of norbornene monomers provides a general strategy for structure–property tuning in FROMP without altering backbone chemistry. Examples will highlight how subtle changes in side-chain length, connectivity, and functionality influence front propagation, stability, and viscoelastic response, establishing side-chain design as a powerful and tunable handle for advancing the scope of FROMP-based materials.

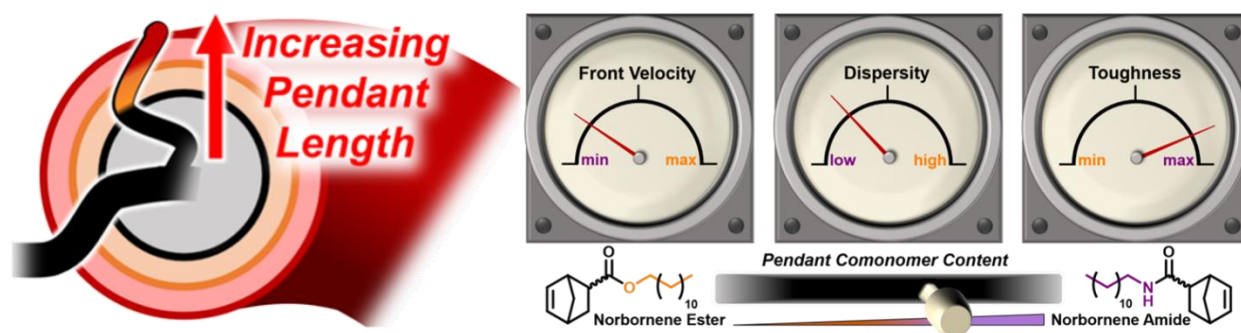


Figure 1. Pendant group design via *n*-alkyl chain length (left) or linkage (right) in frontally fabricated polynorbornene elastomers and thermoplastics enable modular, high-performance thermomechanical properties.