

Prof. Marc Hillmyer, 2nd Seminar  
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## Tandem Ring-Opening Metathesis Polymerization and Post-Polymerization Saturation Using a Single Catalytic System

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### Abstract

Ring-opening metathesis polymerization (ROMP) continues to be a very powerful technique for the preparation of polymeric materials from cyclic olefins. The examples of functional group tolerance of ruthenium-based metathesis catalysts developed by Grubbs for the preparation of functional polymers are manifold. At the end of the polymerization, the metathesis catalyst can be liberated from the chain ends of the polymer chains by adding an end-capping reagent such as ethyl vinyl ether. However, the ruthenium carbene species can also be converted into a hydrogenation catalyst upon the addition of molecular hydrogen. We took advantage of the dual reactive nature of such ruthenium-based compounds to generate telechelic polyethylene utilizing a hydroxy-containing chain transfer agent during ROMP to install functional endgroups. These telechelics can be used as reactive compatibilizers in blends of polyethylene and polyethylene terephthalate. We also utilized this tandem approach to generate crosslinked polyethylene/hydrogenated polydicyclopentadiene thermosets that were resistant to oxidation as compared to their unsaturated precursors. Importantly, in both examples we utilized very low levels of ruthenium and carried out the hydrogenations in the absence of solvent. In this talk, I will report on both approaches and our current efforts in this area.

