SYNTHETIC EFFORTS TOWARD THE DEVELOPMENT OF STIMULI-RESPONSIVE PROGRAMMABLE POLYMERS: ETHYL ACRYLATE, MALEIC ACID, HEAT

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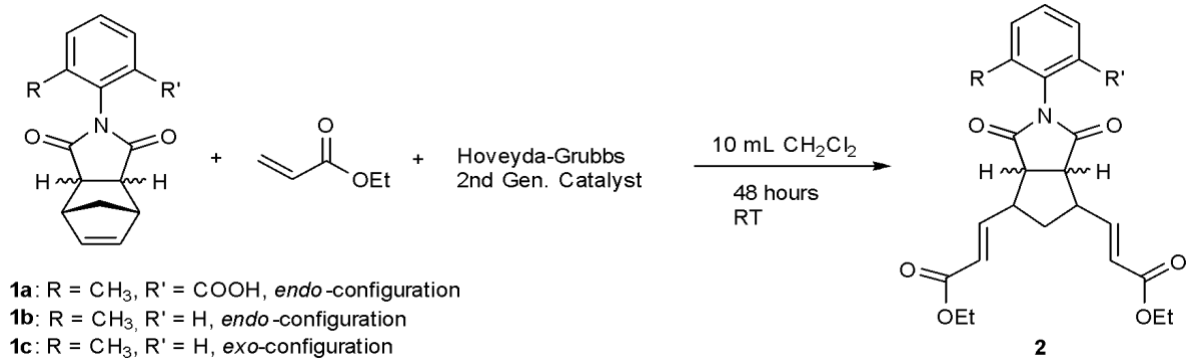
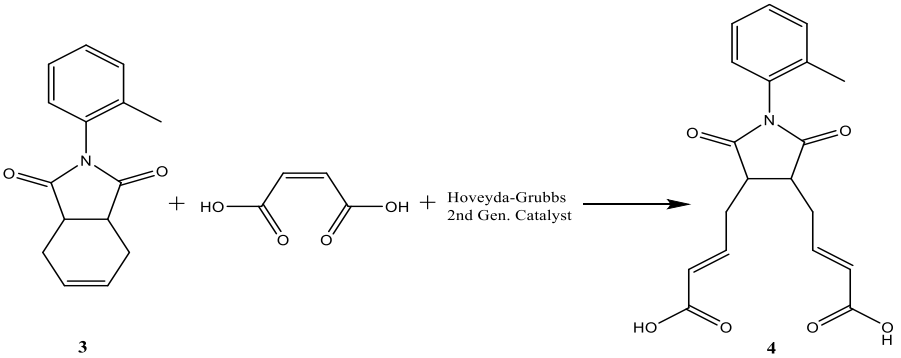
Stimuli-responsive polymers represent an emerging field of smart materials with programmable recognition properties that have important applications including targeted drug delivery and biosensors. We have been working toward the development of polymers that remember the response after a stimulus is withdrawn. To this end, we first must synthesize specific functional monomers. While different types of reactions could potentially result in a desired target monomer, we studied the ring-opening cross metathesis reaction (ROM-CM). Previous work attempted to cross monomer **1(a-c)** with ethyl acrylate by using the more stable Hoveyda-Grubbs 2nd Generation Catalyst, but was unsuccessful. Alternative routes were pursued by using different anhydrides, olefins, solvent systems, and temperatures. We discovered that higher temperatures yielded a cleaner reaction when conducted with certain olefins, but lead to the production of side products with others. In addition, one promising route involved using the new olefin maleic acid in place of ethyl acrylate and crossing it with monomer **3**. This appeared to produce the desired product **4** and work is ongoing to first esterify and then isolate the potential product. Future efforts will involve further study of maleic acid and other olefins, dilute conditions on norbornene reactions, and alternative synthetic routes.



1a: R = CH_3, R' = COOH, *endo*-configuration
1b: R = CH_3, R' = H, *endo*-configuration
1c: R = CH_3, R' = H, *exo*-configuration

2



3 **4**

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