# Synthesis of Depolymerizable Polymers

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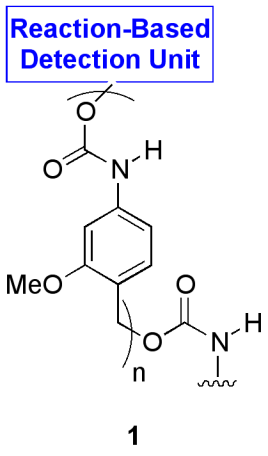
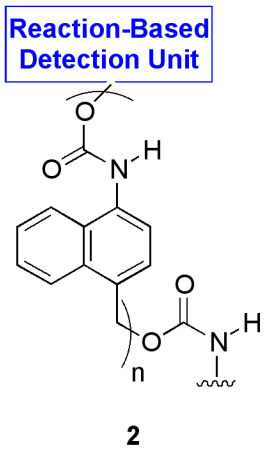
**The goal of this program is to design and synthesize poly(carbamate) polymers that depolymerize completely from one end to the other when exposed to a specific chemical signal. Polymers with this capability will provide a new opportunity for creating plastics, foams, and adhesives with the ability to change shape, size, function, and surface properties quickly and autonomously. Such polymers must balance stability with reactivity, and therefore, the design and synthesis of these polymers will require unique strategies. Our studies are based on three hypotheses that—individually or in combination—should allow the preparation of polymers that are stable to environmental conditions, but also that are capable of depolymerizing within seconds to minutes when exposed to a specific signal. This proposal also describes synthetic strategies for preparing these types of polymers from petroleum-based feedstocks.**

Towards this end, we have now identified two strategies (in model systems) that should enable rapid depolymerization of poly(carbamates). These strategies include (i) increasing the electron density of each repeating unit (compound **1**), and (ii) decreasing the aromaticity of each repeating unit (compound **2**). Compared to a standard benzene-based repeating unit (compound **3**), these two strategies increase the rate of depolymerization 28× and 12×, respectively.




**1**

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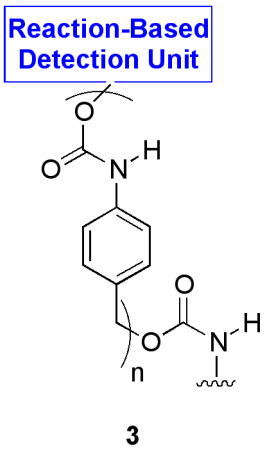


**3**