UNIVERSITY OF RHODE ISLAND

Department of Chemistry

SEMINAR

Room 234 Pastore Hall

3:00 p.m, Wednesday, Feb. 24, 2016

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Graduate Student

Chemistry Department

URI

"Biodegradable Polymers"

HOST

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Biodegradable Polymers

ABSTRACT

Currently there are a wide variety of polymers being used for water treatment, cleaning detergents, adhesives, cosmetics, and throughout the chemical industry. A major problem with these polymers is that they do not degrade very well and are hard to recover for proper disposal. I will be talking about the synthesis of a degradable polymer alternative to poly(acrylic acid) (PAA) while maintaing the same functions and properties. PAA contains an all carbon backbone and a high molecular weight (MW) around 4000 g/mol. In order for a polymer to be biodegradable, it needs to have a MW less than 600 g/mol[1]. Additionally, the pharmaceutical and biomedical industry require biodegradable polymers that can assist with drug delivery and the development of new prosthetic technology. In order to make PAA biodegradable, the backbone of the molecule needs to contain a degradable part at each repeating unit. Dr. Simon's team synthesized a compound called poly(glyceric acid carbonate) (PGAC) that contains a carbonate structure in the backbone[2]. When PGAC degrades, it produces CO_2 and glyceric acid, which are safe, nontoxic, and renewable. PGAC was synthesized by using a method of catalytic epoxide/CO_2 copolymerization. To determine degradation, aziridine crosslinked hydrogels mixed with PGAC and PAA were placed in an aqueous $NaHCO_3$ solution of pH 7.4 and 8.4[3]. After 2 hours, the diameter of the hydrogels were measured to calculate the rate of degradation.

1. Paik, Y. H.; Simon, E. S.; Swift, G. A Review Of Synthetic Approaches to Biodegradable Polymeric Carboxylic Acids for Detergent Applications. *Advances in Chemistry Hydrophilic Polymers Performance with Environmental Acceptance*. **1996**, 79–98.

2. Zhang, H.; Lin, X.; Chin, S.; Grinstaff, M. W. Synthesis And Characterization of Poly(Glyceric Acid Carbonate): A Degradable Analogue of Poly(Acrylic Acid). *Journal of the American Chemical Society*. **2015**, *137*, 12660–12666.

3. Kopeček, J. Hydrogel Biomaterials: A Smart Future? *Biomaterials*. **2007**, *28*, 5185–5192.