Regenerative Medicine: Synthesis of Functionalized Polyglycidol Building Blocks for Diverse Networks

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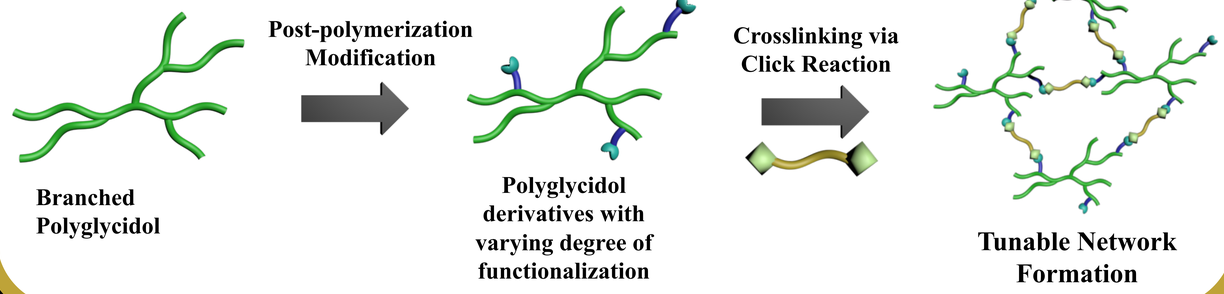
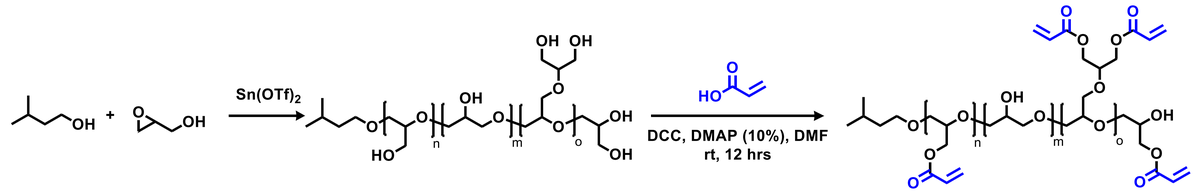
Abstract

- **Regenerative medicine** is a field which is geared toward the bioengineering and implementation of human cells, tissue, and/or organs in order to restore expected function. Recently, a more diverse approach using network forming materials, as opposed to stem cells, has emerged as an innovative concept in this field.
- Currently in our lab, we are manipulating the **post-polymerization of branched polyglycidol individually with a carboxylic acid and a ketone**. Due to the reactive nature of both compounds, our lab expects these materials to form a robust **intercalating polymeric network** with tunable crosslinking with suitable crosslinkers or other polyglycidol building blocks.
- This tunable amount of crosslinking could lead to the **engineering of scaffolds** with different characteristics that could mimic cartilage, dermal, bladder, and liver tissues.

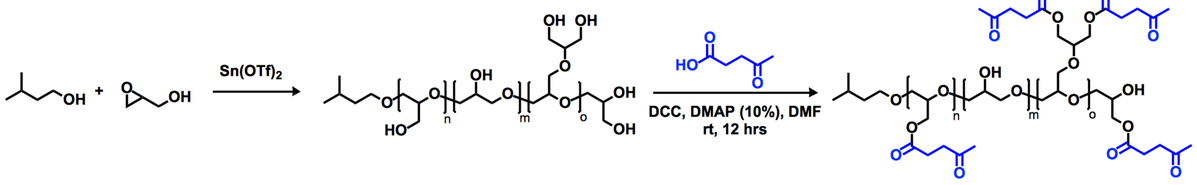
Project Overview

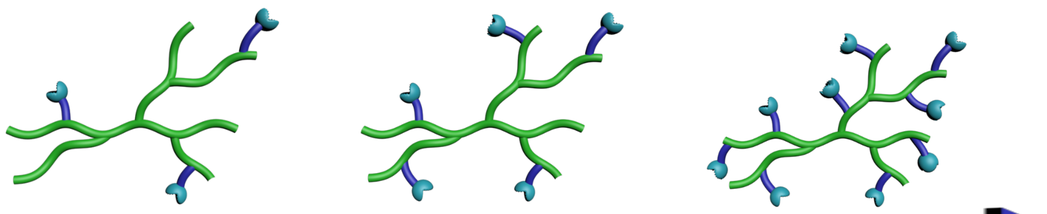


Synthesis and Post-polymerization Modification of Branched Polyglycidol



Starting Material → **Branched Polyglycidol** → **Post-polymerization Modification**

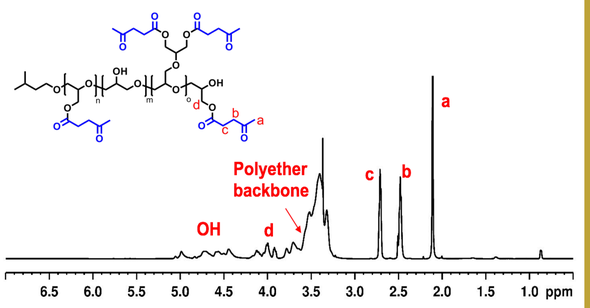


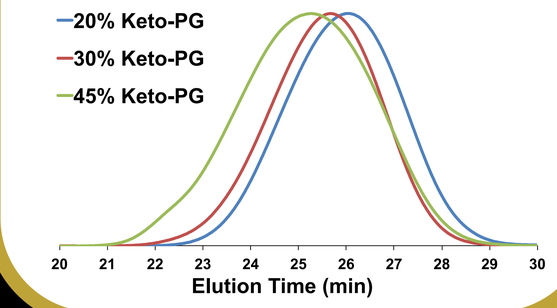


DF 30% 45% 60%

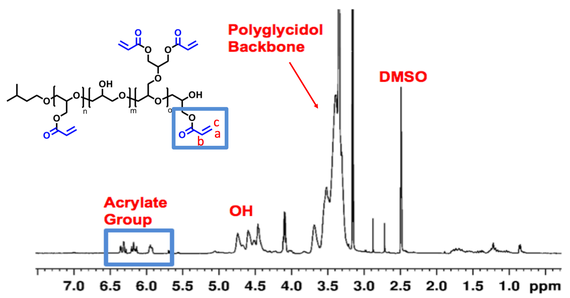
Increasing degree of functionalization = Increasing number of functional groups available for crosslinking

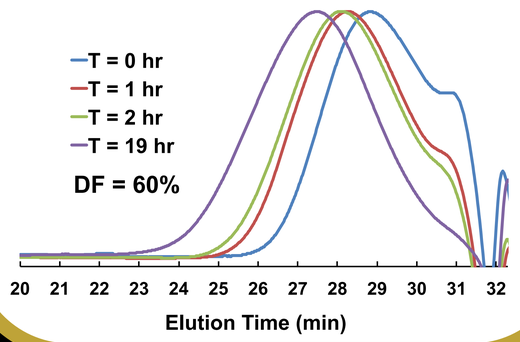
^{1}H NMR and GPC Analysis of PGLY γ-Ketoester Derivative





^{1}H NMR and GPC Analysis of PGLY Acrylates Derivative





Conclusions/Future Work

- The **novel approaches** of post-polymerization of a branched polyglycidol with an acrylic acid and a **γ**-ketoester resulted in **various ratios of functionalization**.
- Plans for **future research** include forming a tunable network with a variety of crosslinking densities that can result in the engineering of scaffolds that posses **regenerative medicine applications**.

Acknowledgements

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