

Synthesis and Properties of Bio-based 3D Printable Resins

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A photopolymer resin is a monomer that, when introduced to light of a certain wavelength, starts to polymerize into a solid. This has become a growing part of the 3D printing industry. There have been many advancements in the field of 3D printing, however, a lot of these resins are not environmentally friendly and even harmful if not handled in the correct manner. Plant based resins are becoming more and more popular because of their biodegradability and for the possibility of using renewable resources. Glycerol is a plant-based compound that is produced in excess in industry. Glycerol obtained from bioethanol production as waste and can be used for value-added chemicals. Also, changing the wavelength of light required to polymerize means that researchers are trying to move away from using UV light because it is very harmful to human skin and can even damage a person's vision. Also, UV light creates ozone as a by-product which can be harmful to the environment. This combination can have multiple real-world applications, not limited to 3D printing. It can possibly be used for gas separation and even polymer batteries.

In this presentation, we converted glycerol based secondary alcohol into photopolymerizable resins. For preliminary studies, we varied the alkyl groups of the secondary alcohol containing ether and photopolymerized with different amounts of crosslinkers. We also used plant-based resin to get 3D printed polymers to see their properties. Finally, our synthesized resins mixed with commercial plant-based resins will be used to get 3D printed structures. Synthesis and characterization of these resins will be shown in the presentation.

Key Words: Photopolymer, Resin, Glycerol, Biodegradable Polymer