3D Printing of Biodegradable Material

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The biodegradable materials from renewable natural resources contributes to sustainability and reduction in the environment impact associated with waste disposal. 3D printing offers the manufacturing of various products with less waste and less energy. This research introduced biodegradable functional groups to light curable methacrylate materials through a novel synthetic approach and created 3D printable materials to make biodegradable polymeric products. A non-biodegradable acrylic material without biodegradable groups was also formulated as a control. The tensile testing dogbone shaped bar samples for both non-biodegradable control material and biodegradable material were printed out in a DLP 3D printer and post cured in a self-built LED light unit. These 3D printed biodegradable and control bar samples were studied for tensile properties and weight loss under accelerated aging condition. Biodegradable bar samples demonstrated biodegradable properties with significantly reduced flexural properties and obvious weight loss over time while control bar samples did not degrade over time under the same condition. This study demonstrated the successful development of light curable, biodegradable 3D printing materials, which can be used in various applications.

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