

UV-CURABLE STARCH BASED MATERIALS

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Nowadays, we witness a steady rise in the introduction of new bio-renewable resources as alternatives for petroleum-derived polymeric materials due to increased environmental concerns and depletion of petroleum feedstocks. Among bio-renewable monomers, starch is an abundant polysaccharide composed of a mixture of two different D-glucose polymers: amylose and amylopectin. Amylopectin is a highly branched polymer, while amylose is linear. In order to render starch light processable it was gelatinized and methacrylated by a simple reaction with methacrylic anhydride. The photocuring reactivity of the methacrylated starch (MS) with lithium phenyl-2,4,6-trimethylbenzoylphosphinate as a photo-initiator was evaluated. 3D printable hydrogels with good cell viability with human fibroblast cells were successfully fabricated by digital light processing (DLP) directly from an aqueous solution. The properties of the hydrogels could be easily tuned by simply changing the concentration of starch in water [1]. Promising UV-curable coatings were also obtained by casting the aqueous MS solution on a glass substrate and photocuring it in the dried state. The biodegradability of MS before and after the irradiation was evaluated by following the enzymatic degradation by α -amylase (from *Bacillus licheniformis*) determining the amount of glucose and maltose released [2].

[1] Noè, C.; Tonda-Turo, C.; Chiappone, A.; Sangermano, M.; Hakkarainen, M. Light processable starch hydrogels. *Polymers (Basel)*. **2020**, *12*, 1359, doi:10.3390/POLYM12061359.

[2] Noè, C.; Tonda-Turo, C.; Carmagnola, I.; Hakkarainen, M.; Sangermano, M. Uv-cured biodegradable methacrylated starch-based coatings. *Coatings* **2021**, *11*, 1–10, doi:10.3390/coatings11020127.