Advanced Polymers for Biomaterials and 3D Printing

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The CD Labs' research is focused on important research questions in oral and maxillofacial surgery: Materials for 3D printed implants and bone adhesives, especially for complex fractures.

The field of 3D printed implants has seen significant progress. Suitable implants are notable for their ability to be customized based on a patient's CT scans and for their use as support for tissue growth. They help bone tissue to regenerate while also breaking down over time. The material must meet these requirements: it must not be toxic, be able to be printed using 3D technology, and be able to be customized and integrated. The implants must be strong, porous, and provide nutrients.
We study individual components of complex formulations containing degradability enhancers [1], toughness enhancers [2-4], photoinitiators [5], fillers, bio-interactive components like hydrogels [6] etc. and final products, either biocomposites or bioceramics [7] from the viewpoints of biomedicine and material science.

Bone adhesives, on the other hand, are used when screws and/or plates are no option for fixing broken bones, like in cases of comminuted fractures. Like 3D printed implants, the ideal bone adhesive should be strong and porous, and it should break down over time, however, also needs to contain so-calles primer molecules, which establish adhesion to bone substance and also enable, e.g., light-triggered curing. [8]

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