Title: 3D-printing applications in research

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Keywords:
3D-printing, Stereolithography, Selective laser sintering, Fabrication

Abstract
3D-printing allows quick fabrication of complex tools and parts. Stereolithography (SLA) and selective laser sintering (SLS) are 3D-printing methods that can produce durable and autoclavable parts from wide range of materials, from biocompatible polymers, both soft and hard, to flexible plastics.

SLA is a 3D-printing method based on UV-curable resins, such as epoxies, acetates and urethanes. These are cured in the printer layer by layer, using a UV-light source, such as a UV-laser. SLA has excellent surface quality, which makes it advantageous to mould applications. The other advantage is material selection, both rigid and soft materials, some of which are biocompatible, and approved for human use.

In SLS plastic dust is sintered together with a laser. Common materials for this method are high performance thermoplastics such as nylon and its modifications such as carbon fibre reinforced nylon. These materials are durable and can be autoclaved repeatedly. However surface quality of SLS prints is not as high as with SLA, which limits its applications to ones without tiny features.

In this work we discuss 3D-printing and its applications in supporting research. In this work we also present some examples of 3D-printing we used to create tools and parts as part of our research, such as tool developed for handling implants in compartmentalised cell culture. We discuss advantages offered by 3D-printing, and 3D-printing methods available at our university.