Geometric Optimization of Microcontainers for Oral Drug Delivery

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ABSTRACT

We have fabricated microcontainers for oral drug delivery using top down clean room processes [1]. This allows for considerable freedom of geometric design compared to nano particle systems without giving up the the continuum-like behaviour.

The potential of utilizing a complex geometry will be investigated using in-vitro testing and additive manufacturing – possibly with some up-scaling [2].

Currently we are pursuing a gecko feet design with small branching and pointy structures on the container top, see Fig 1. This design has been generated using the method of topology optimization [3]. We hope that a strong geometric contrast between the top and bottom of the container can facilitate uni-directional release and thus improved bioavailability.

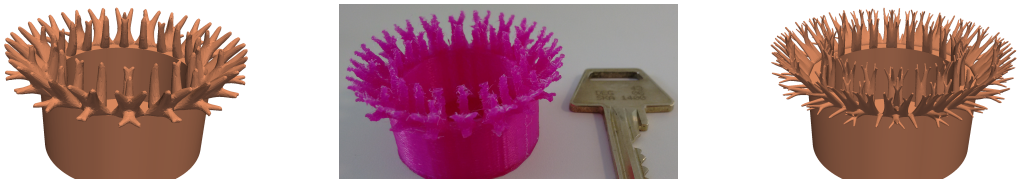

Figure 1: Designs generated using topology optimization are shown. An objective function related to heat conduction gives a hairy design with more or less branching (right or left). A preliminary extrusion based on fused deposition modeling is shown in the center. Currently, there are no plans for in vivo testing.

REFERENCES

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