3D Printing of Bio-inspired surfaces

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Summary
The ability of the gecko to scurry across smooth or rough surfaces, regardless of inclination (vertical or even upside down), has been traced to the multiscale hierarchical structures of the gecko toe [1 - 3]. Considering all the strategies to manufacture bio-inspired surfaces, the most common is polymer replica molding (REM) [4]. This project will further study the influence of pillar size, shape, aspect ratio, tilting angle and levels of hierarchies in terms of wettability and adhesion, using a cost effective rapid prototyping method with direct light processing (DLP). The aim of this project will be to seek the feasibility to rapid prototype gecko surface geometries. Furthermore, a micromanufacturing method is proposed using DLP and a mask.

Project concepts and working procedure

Proposed manufacturing method
The minimum feature size with DLP is 5 µm. The printer will be pushed to the limits to create the minimum achievable pillar size.

The spatulae will be manufactured using a mask placed in the projector to reduce the feature size.

With this method it is expected to create micro/nano hierarchical features using conventional rapid prototyping.

References