Developing Optimal Fused Deposition Modeling Surfaces for Cell Growth in Lab-On-A-Chip Applications

Dixit, Suraj (School: Kalamazoo Area Mathematics and Science Center)

Lab-on-chip (LOC) technology is a developing nanotechnology that has promising applications in cell and tissue engineering. These devices must be hydrophilic, non-toxic, and inexpensive. Current LOC devices are fabricated using resin-based Stereolithography (SLA) 3D printers. SLA resins have significant drawbacks, such as cytotoxicity, limited selection, inaccessibility, and high costs. Conversely, Fused Deposition Modeling (FDM) 3D printing opens doors to more biocompatible materials such as ABS and PLA at a fraction of the cost. This design project aims to determine the viability of FDM-printed chips as cell growth surfaces by developing and optimizing a hydrophilic prototype surface. The research follows a rapid prototyping process whose aim is to lower the water contact angle, a key indicator of hydrophilicity. The prototype demonstrates strong cell adhesion characteristics and low water contact angle, which confirms its biocompatibility.

Awards Won:

National Anti-Vivisection Society: Awards of $3,000