

## Fabrication of lipid microneedle by Inkjet printing for prolonged drug delivery

### Master/Semester project

(Section: Microengineering – Mechanical Engineering – Bio engineering – Materials Science)

The project focuses on the development of lipid microneedles using inkjet printing for prolonged drug delivery. Microneedles represent a huge advancement in transdermal drug delivery systems, offering a minimally invasive and efficient method for administering medications over extended periods. Co-administration of poorly water-soluble drugs with lipid formulations can enhance the bioavailability of these drugs. Administration of drugs encapsulated lipid formulations can be the one way of achieving this. Recently fabricating the various design of drug-lipid formulations enabled by the development of additive manufacturing techniques. However, fabrication and utilization of lipid microneedle has many challenges due to intrinsic characteristics of lipid. The primary goal of this project is to develop core-shell lipid micro needle using inkjet printing for precise dimensions and drug-loading capacities. The plan involves a detailed investigation of suitable lipid materials, optimization of the inkjet printing parameters, and thorough evaluation of its mechanical and chemical characteristics, microneedles' structural integrity, drug release profiles.

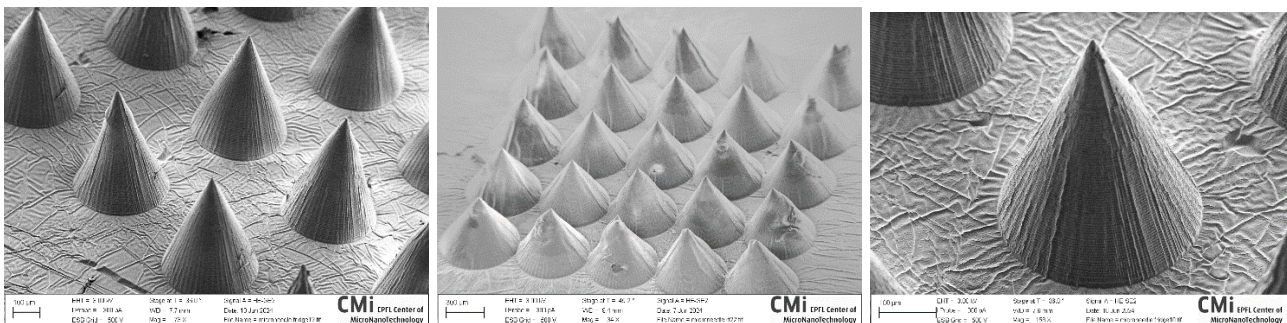


Figure SEM image of fabricated lipid microneedle by IJP

#### Work description:

- Fabrication of lipid mold in CMI
- Fabrication of lipid micro needle using IJP
- Characterization of microneedle (mechanical and chemical)
- In vitro drug release measurement from microneedle

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