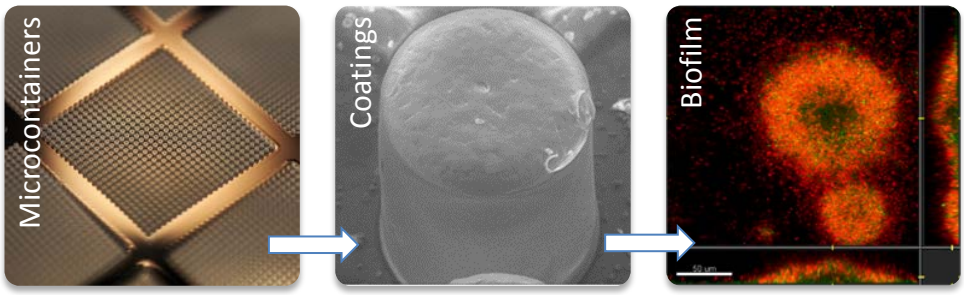
Microcontainers for improved treatment of biofilm



Cystic fibrosis is an inherited life-shortening condition in which about 80% of deaths result from severe pulmonary damage due to respiratory tract infections. The chronic infection is mostly caused by the bacteria, *Pseudomonas aeruginosa*, which despite treatment with various types of antibiotics is very difficult to eradicate successfully. The bacteria evade the antibiotic treatment due to various tolerance mechanisms as well as inefficient antibiotic delivery to the infectious target sites. Layers of viscous mucus and bacterial biofilms creates a diffusional barrier and thereby protects the bacteria from the antibiotics. In addition, the powdered antibiotics distribute in all areas of the lungs and a certain degree of dilution takes place, hence a more targeted delivery is needed.

Micrometer sized polymeric cylindrical containers (known as microcontainers) have been developed for oral delivery of therapeutics. Studies have shown that the microcontainers are engulfed in the intestinal mucus. This property may be used in the treatment of biofilms in patients suffering from diseases like cystic fibrosis. It is hypothesized that the microcontainers can be used for targeted delivery of antibiotics by overcoming the biofilm and achieving a burst release of antibiotics in locations where the bacteria are present.

Example of topics for bachelor, special course or master thesis projects:

- Can burst release of antibiotics be achieved by incorporating various excipients in the microcontainers?
- How does various pH-dependent and water-soluble polymers affect the release of antibiotics?
- Does application of mucopenetrating polymers improve the penetration of microcontainers into the biofilm?
- Can mucolytic agents be used to improve the treatment of biofilm?

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