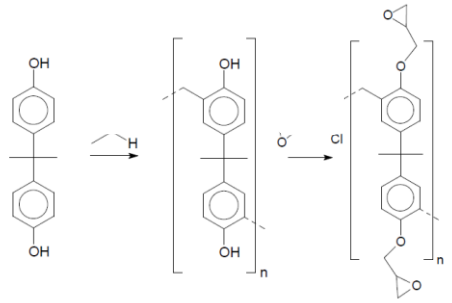
Digitally printed photopolymers for watch industry

The project aims to replace the manual application of protective coatings within the watch manufacturing cycle with a digital printing process. This will be realized by pursuing three main objectives that reflect industry needs:

(i) develop a printable resin to ensure the desired protective function
(ii) identify a digital printing technology with the requested spatial definition down to 10 µm
(iii) ensure traceless removal of the protection, either by dissolution or preferably by peeling off or delamination.

By developing a printable ink based on a reversible photopolymer that can be cured (hardened) with light and afterwards removed via irradiation with a second wavelength of light.

Product design, synthesis and characterization:	*CAD modeling, printing and automation:*
	

Digital printing methods have the potential to fulfill the requirements imposed on the application of protective resins in serial production. However, research is needed to find sets of printable photo-curable resins for desired printability, protection function and traceless removal.

You will be working on objective (i) of the project, performing the chemical functionalization and characterization of the photo-resin. Afterwards, evaluation of the coating films based in the chemical composition of the photo-resins will be investigated.

Where: EMPA – Dübendorf at Coating Competence Center (CCC)

CCC - printing techniques: https://www.empa.ch/web/coating-competence-center/printing-and-wet-coating
Aerosol Jet Printing and Industrial Inkjet Printing examples: https://www.youtube.com/watch?v=T7rxQAQAI40

Duration: 2 - 6 months (as semester or master thesis)

What you will learn: chemical functionalization, physical-chemical characterization techniques such as FTIR, NMR, DSC and TGA. Coating techniques such as industrial inkjet printing, aerosol jet printing, spin coating and dispensing.

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