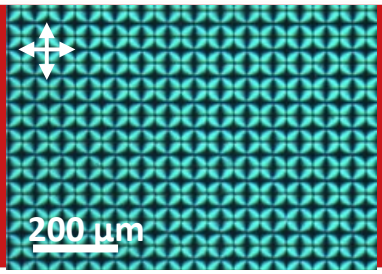
Human Interactive Materials (HIM)

Programmable dynamic surface topographies

Yuxin You and Danqing Liu



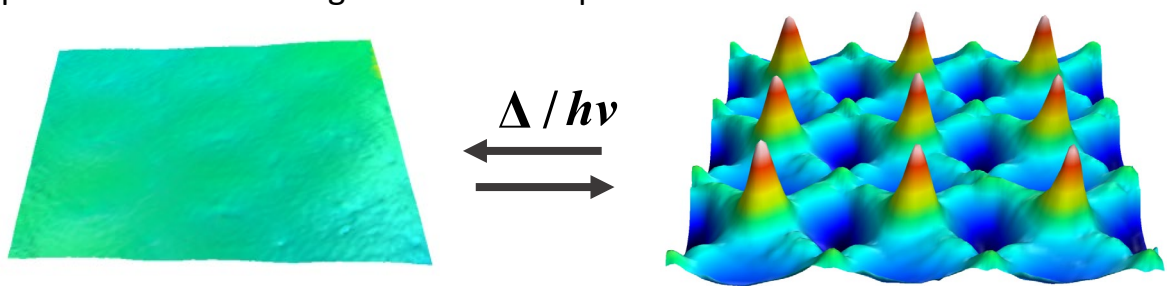
Patterned LCON characterized by Polarized optical microscope

Introduction

Surface topographies play a vital role in nature. For instance, goosebumps on mammals' skin can conserve heat. Cuttlefishes generate textures on their skin for camouflage. The ingenuity of these creatures lies in regulating the functionality of their surface by switching their topographies to interact with the surrounding environment. Here, we would like to develop smart coatings with dynamic surface topographies which are anticipated to benefit many new functions in the fields of haptics and robotics.

Project summary

Liquid crystal oligomer networks (LCONs), combine the elastic properties of rubber and the anisotropic properties of liquid crystals, are among the most promising materials to prepare surface topographies. In this project, we will fabricate LCON coatings on the substrates with pre-programmable patterned defect information which is established by photoalignment technology. The prepared coating can be reversibly actuated by heat, light, or electricity to form various surface topographies you like. Next, we will apply them for certain functions, an example is the formation of cilia to mimic the natural archetypes-hair structure on gecko feet for super adherence.



3D image of the surface topogeaphies

Project goals

Some of goals can include:

- Design the defect pattern for certain topographies.
- Characterize and study the actuation for dynamic surfaces.
- Explore more applications, for example in the fields of haptics and robotics.

Contact information

Yuxin You - y.you1@tue.nl - STO 0.27