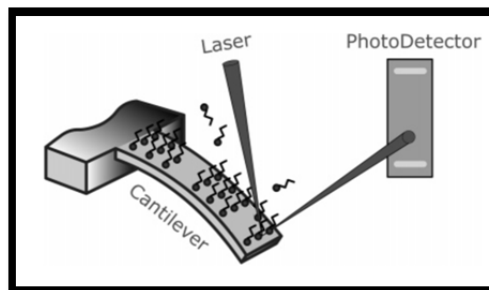


Actual surface-stress measurement in biological detection

The principle of bio-molecular detection in nano-mechanical sensors, is that molecular adsorption changes the surface stress on one side of a plate-like component, and bends it. The deflection of this component is usually read by optical techniques, like laser beam deflection, and then translated to the amount of surface stress by analytical formulations.

However, the adsorption of the target molecules on the selective layer is not always uniform, and thus the amount of surface stress, which is detected, is just an approximate of the real value. In this project, we want to detect the actual shape of the clusters of the target molecules on the selective layer and use that to find the actual amount of the surface stress. Major challenges of this project are complex modelling, experimental setup and validation of the analytical results.

This graduation project would be in collaboration with the PhD project: “Stability calibration of nano/micro plates”, in SOM group.



Objectives:

- Surface functionalization of active sensing area with labelled target biomolecules and characterization of the detection with functionalized cantilevers;
- Imaging surface of the plate to discover the shape of the functionalized area, composed of surface-immobilized target biomolecules, and translating the image to the image to a finite element model of the cantilever;
- Computational modelling of such a system to calculate the induced surface stress by comparing the experimental results with the analytical FEM.

Requirements:

We are looking for a candidate in the track of SOM or MNE, with strong experimental and analytical skills and able to work at the intersection of several research domains (structural mechanics, nano/micro engineering and multi-physical modelling).

Opportunities

- Work in a multidisciplinary research group within an international environment
- Become an expert in the field of nanomechanical sensing
- Learn how to carry out a literature study and how to give scientific presentations and professionally publish your work

Further information:

If you are interested in this project as your graduation assignment feel free to contact Banafsheh Sajadi (b.sajadi@tudelft.nl).