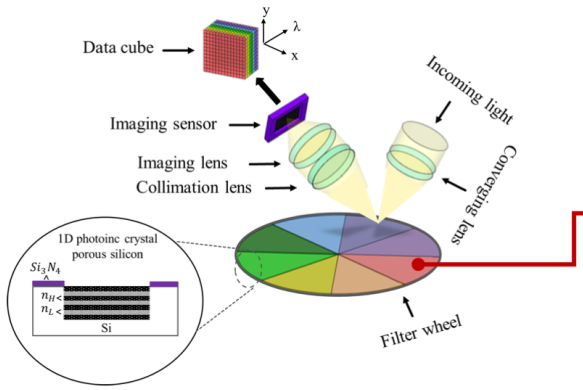
MSc Thesis

Development of a MEMS-based magnetic levitation device using ultra-thin flexible glass substrates for spectral imaging applications

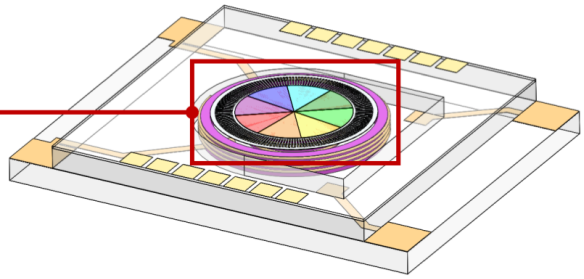
Work Description

Hyperspectral imaging (HSI) is an emerging technology which combines imaging and spectroscopy to provide information about the composition of an object by acquiring a spectrum for each pixel in the image. HSI has found many applications in research and industry in recent years, such as disease detection, food safety, and material sorting. However, current HSI systems are still relatively bulky and costly, which limits their mobility and wide-scale adoption. In order to overcome this, we develop a portable compact HSI system based on magnetic levitation and porous silicon optical filters.

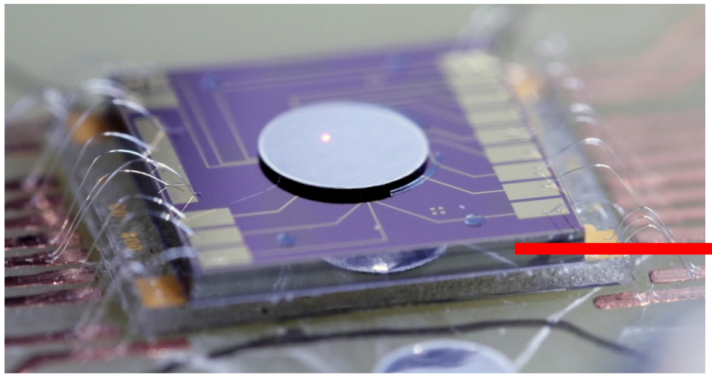
The **main objective** of this MSc thesis is to develop the MEMS-based levitation device using an ultra-thin flexible glass substrate. This involves the development of the fabrication process using the ultra-thin glass in the cleanroom. Finally, the miniaturized levitation device is tested for the application of spectral imaging using a porous silicon filter wheel.



Wavelength-scanning spectral imaging in reflection mode using a rotary filter wheel made of 1D photonic crystal porous silicon.



Magnetic levitation device for contactless suspension and rotation of the filter wheel



Demonstration of magnetic levitation of an aluminum disk using the miniaturized levitation device. (photo courtesy: Dr. Kirill Poletkin)

Ultra thin flexible glass
http://www.schott.com/d/advanced_optics/db832253-0598-4da4-8c88-8784839ccc8b/1.2/schott-ultra-thin-glass-electronics-appl-nov-2015-eng.pdf

Link to YouTube video of the micro-levitation device:
https://www.youtube.com/watch?v=3Z2cDCugWcU

Starting date: as soon as possible

Duration: 6 months
(possibility to start with 1-2 months of HiWi work before the MSc thesis)

Qualification

- Background and interest in microsystems and microfabrication
- Experience with lab measurements (electrical/optical)
- Experience with 2D and 3D CAD design
- Independence and reliability

If you are interested, please send your CV, and a transcript of records, in a single PDF file to: Mohammad Abdo (mohammad.abdo@kit.edu).
Suitable candidates will be invited for an interview at KIT-Campus North.

Contact Information:

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