

Metasurface holograms (Bachelor/Master Project)

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Project description:

Metasurfaces, two-dimensional surface-confined nanostructures (termed as meta-atoms), have been gaining increasing attention due to their remarkable abilities in light manipulation, versatility, ease of on-chip fabrication, and integration owing to their planar profiles. Many exotic phenomena and useful flat optical devices have been demonstrated, such as polarization converters and meta-holograms (Figure 1).

In this project, you will design holograms with the Fourier optics, fabricate the metasurface, and do the optical characterization with home-build optical microscopes. Specifically, you will first use Fourier optics to design optical holograms and then make the patterns with designed meta-atoms. Through this design, you will know how to project the objects with Fourier optics and use metasurface to achieve different phases. After that, you will fabricate the sample with the electron-beam lithography and then conduct optical measurements with a home-build microscope. Through these experiments, you will get a first experimental look at nano-sized and micro-sized structures. The practical part of the project required you to write MATLAB code to generate holograms with selected images and then create the pattern with meta-atoms. You have to plan and set up the home-build microscopes. Furthermore, you have to understand and process the data. The project will teach you theoretical and experimental optics skills as well as data acquisition and processing.

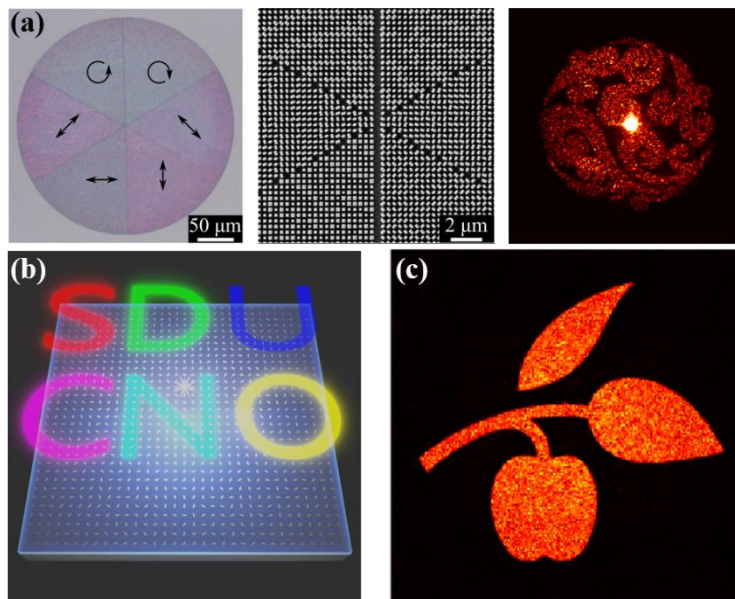


Figure 1. Metasurface-based holograms from SDU Nano Optics.