

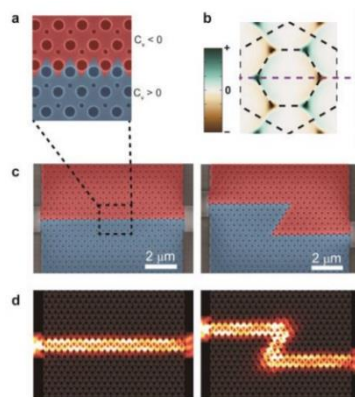
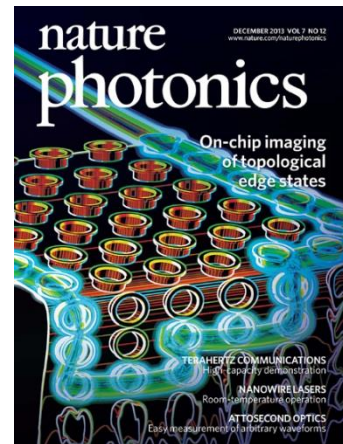
STRUCTURED ELECTROMAGNETIC MATERIALS GROUP

MASTER PROJECT

Project title: Topological Photonics in Silicon-On-Insulator Platform

- MSc
 - Theory and Experiment
-

Background: Topological photonics is greatly inspired by the discovery of topological insulators in condensed matter physics, which was awarded Noble-Prize in Physics in 2016. Topological photonic structures provide a new way to manipulate wave propagation, thus leading to many novel photonic devices, such as reflection-free sharply bend waveguides, robust delay lines, spin-polarized switches, and non-reciprocal devices [1-3]. Topological photonics has been realized by using magneto-optical effects, 3D chiral structures, and bi-anisotropic metamaterials, and it becomes very important to realize topological photonics by use of purely silicon nanostructures, compatible to CMOS technology.



Project description: This project is to realize topological transport in a silicon-on-insulator platform, with the concept of valley pseudospin. The main task is to investigate field enhancement and novel optical microcavity based on the concept of topological photonics. The project includes theory development, device design, cleanroom activities, and device characterization including scattering near-field optical microscopy.

arXiv:1805.10962, from
Jianwen's group

References:

- [1]: L. Lu, J. D. Joannopoulos, and M. Soljacic, "Topological Photonics", Nature Photon., 8, 821 (2014).
- [2]: A. B. Khanikaev, and G. Shvets, "Two-dimensional topological photonics", Nature Photon., 11, 763 (2017).
- [3]: L-H. Wu, and X. Hu, "Scheme for achieving a topological photonic crystal by using dielectric material", Phys. Rev. Lett., 114, 223901 (2015).

Contact persons:

Sanshui Xiao, saxi@fotonik.dtu.dk, 345A, 074
Martijn Wubs, mwubs@fotonik.dtu.dk

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