Contribution ID: **104** Type: **Oral**

Inverse design of antireflection silicon-on-silicon coatings

Thursday, November 7, 2024 4:30 PM (15 minutes)

Designer gratings, also known as metagratings, can be tuned to preform various kinds of tasks, such as amplify deflection in a particular diffraction order, increase or decrease transmission and reflection [1]. A typical task for various kinds of coatings is to reduce reflection from a surface. Inspired by this, we set out to design a single-layer silicon metagrating as an antireflection cover for solar cells, itself made from silicon, which introduces high reflection of light (30-50%) from a flat interface, a significant inefficiency in the cells' ability to capture incident radiation [2]. To achieve desired low reflection (around 5% or less) for both polarizations, a range of incidence angles and a wide band from 400 to 1200 nm, a large space of unit cell designs of the periodic structure has to be explored. In this work, we apply an inverse design approach [3] to solve this task and denerate patterns which demonstrate the required performance.

1. Quaranta G., Basset G., Martin O. J., Gallinet B. Recent advances in resonant waveguide gratings // Las. Photonics Rev. –2018. –12. –№9. –P. 1800017.
2. Mascaretti L. et al. Designing metasurfaces for efficient solar energy conversion // ACS Photonics. –2023. –10. –№12. –P. 4079.
3. Jiang J., Fan J. A. Multiobjective and categorical global optimization of photonic structures based on ResNet generative neural networks // Nanophotonics. –2020. –10. –№1. –P. 361.

Type of presence

Presence online

Primary author: OVCHARENKO, Anton (V. N. Karazin Kharkiv National University)

Co-author: YERMAKOV, Oleh (V.N. Karazin Kharkiv National University, 4 Svobody Square, Kharkiv 61022, Ukraine)

Presenter: OVCHARENKO, Anton (V. N. Karazin Kharkiv National University)

Session Classification: Advances in Metasurfaces and Plasmonic Nanostructures