

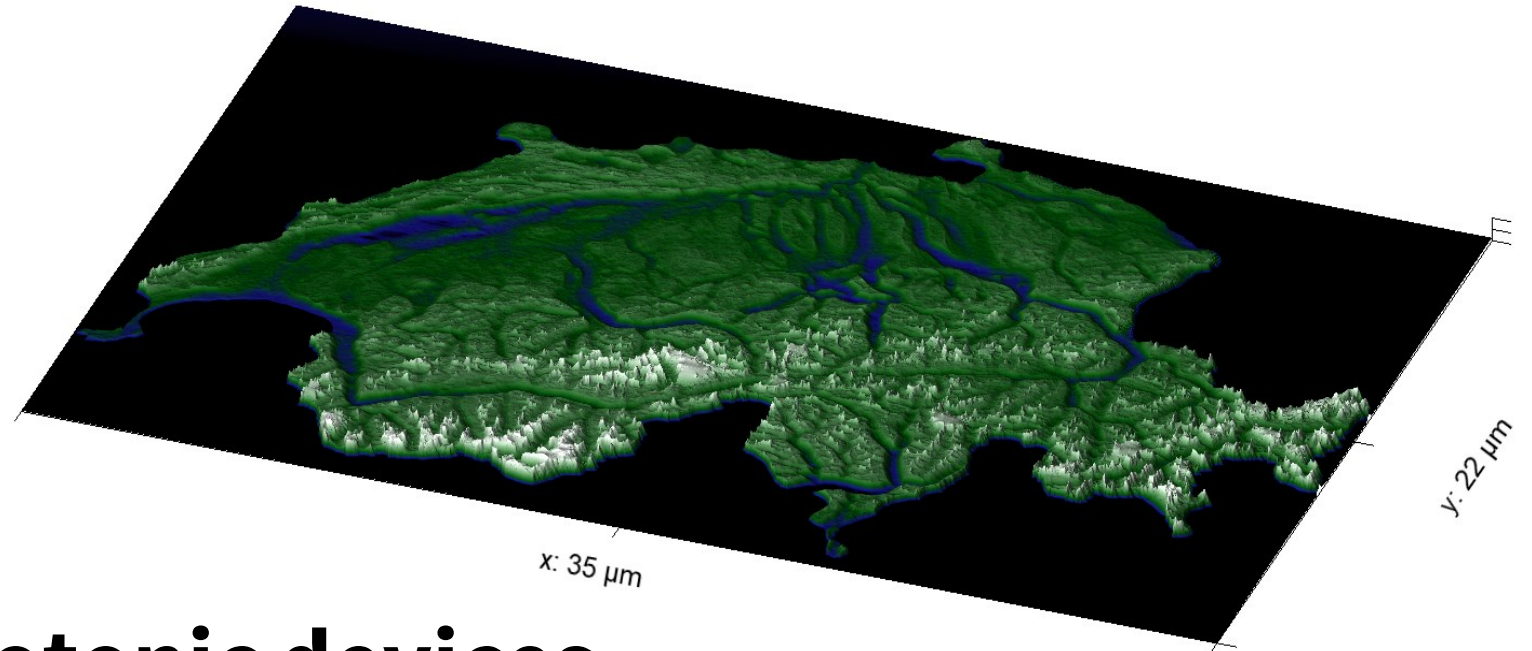
Laboratory for Nano and Quantum Technologies (LNQ)

Paul Scherrer Institute (PSI)

Summer Internship

Jun-Jul 2024

31-07-2024

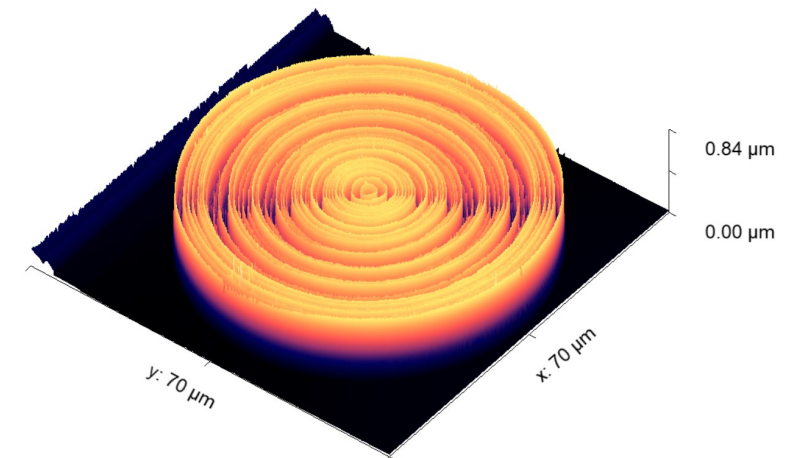


Fabricating 3D photonic devices with grayscale e-beam lithography

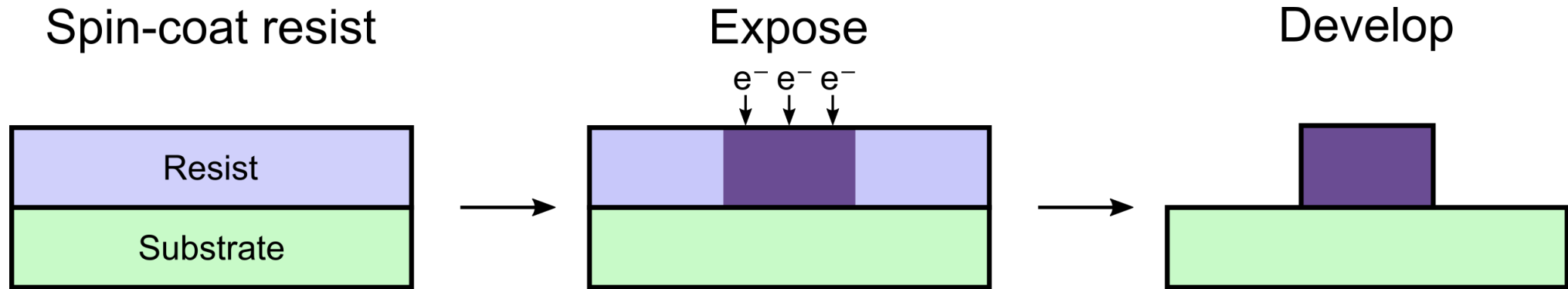
Bjarke Almer Frederiksen

2nd semester, MSc Engineering Physics,

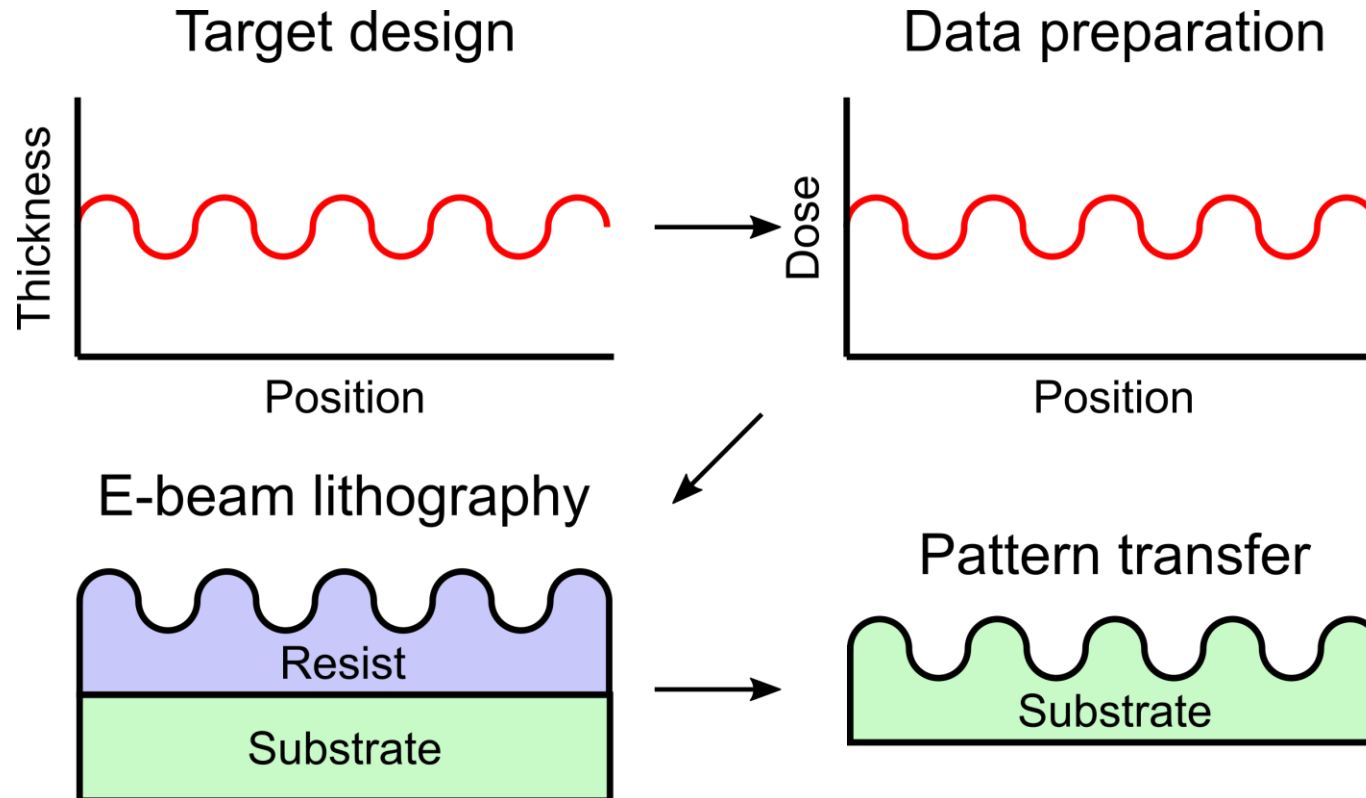
Technical University of Denmark (DTU)



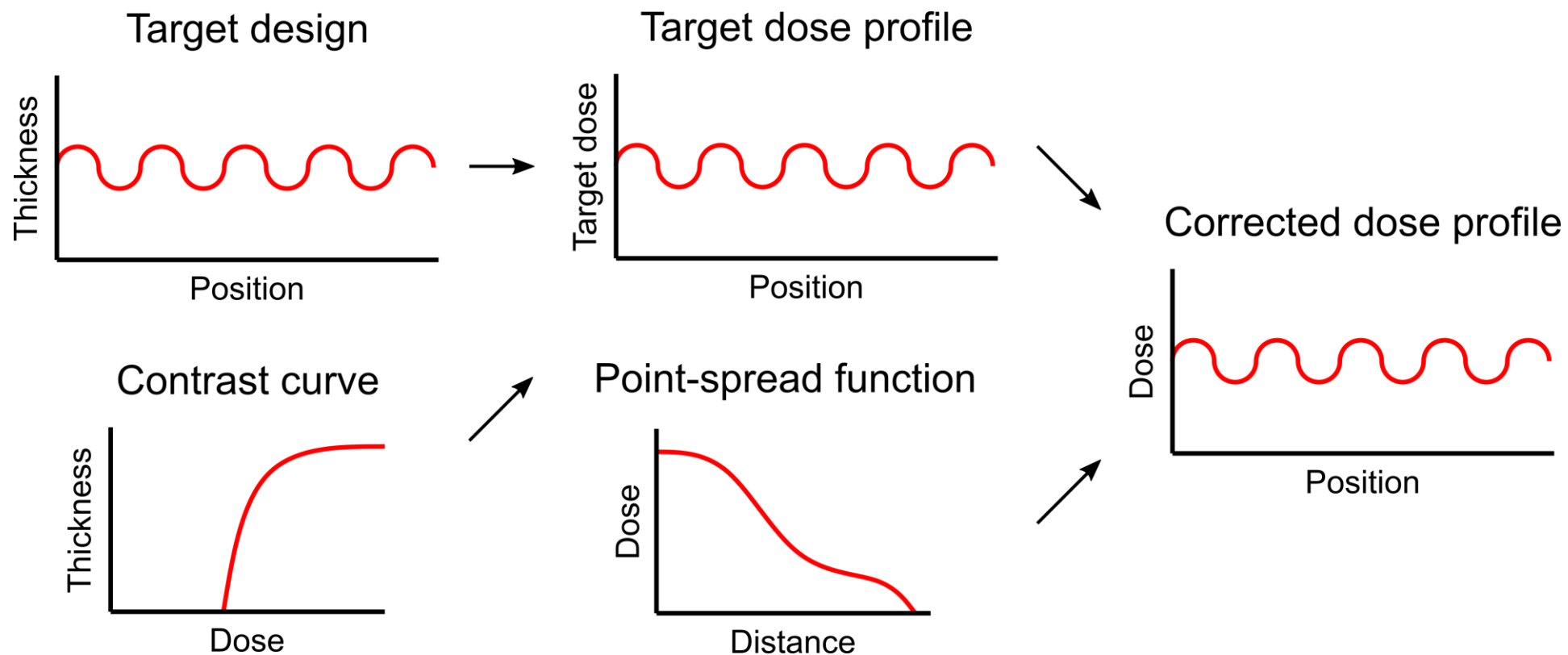
E-beam lithography



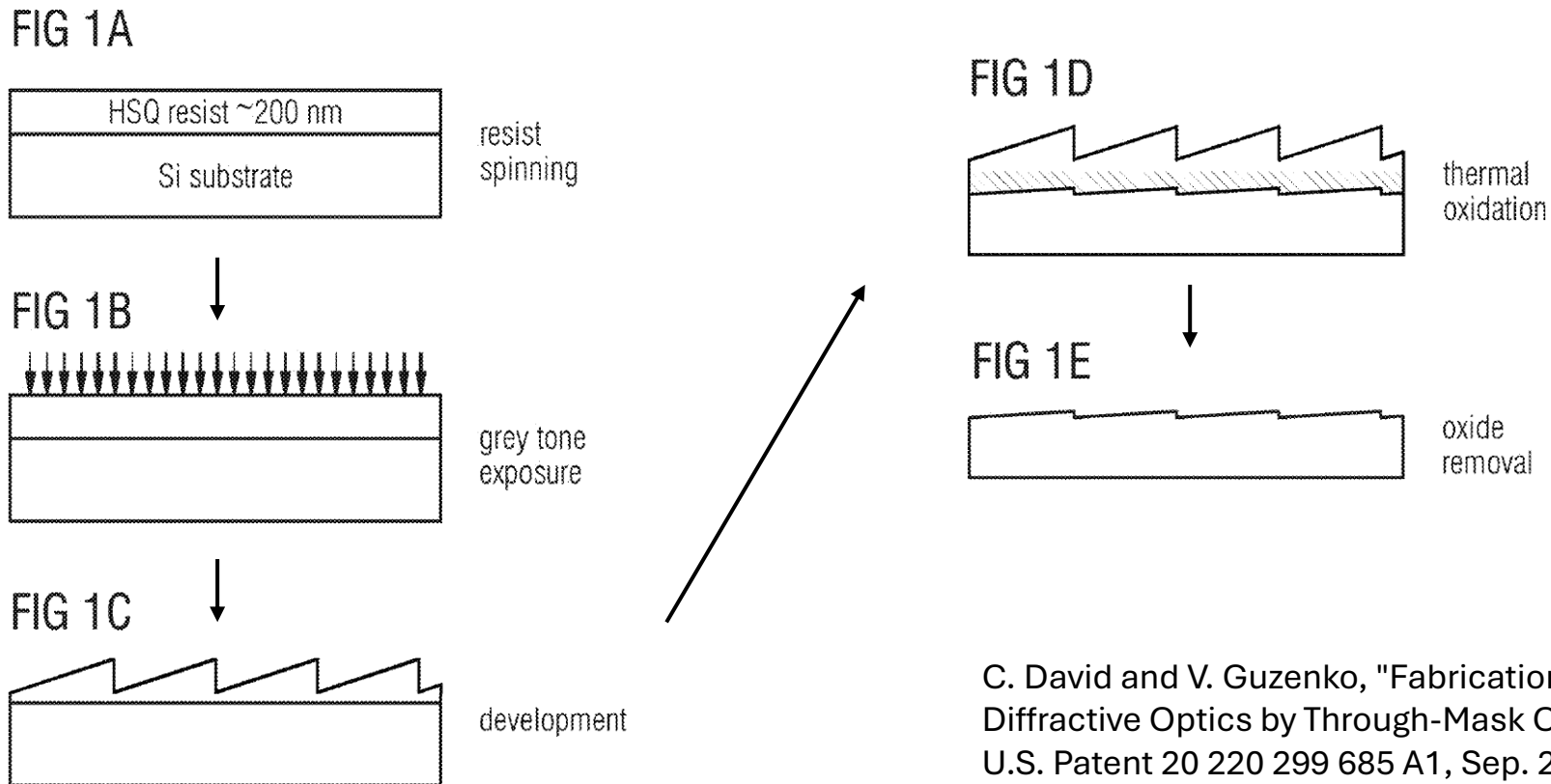
Grayscale electron-beam lithography



Data preparation procedure

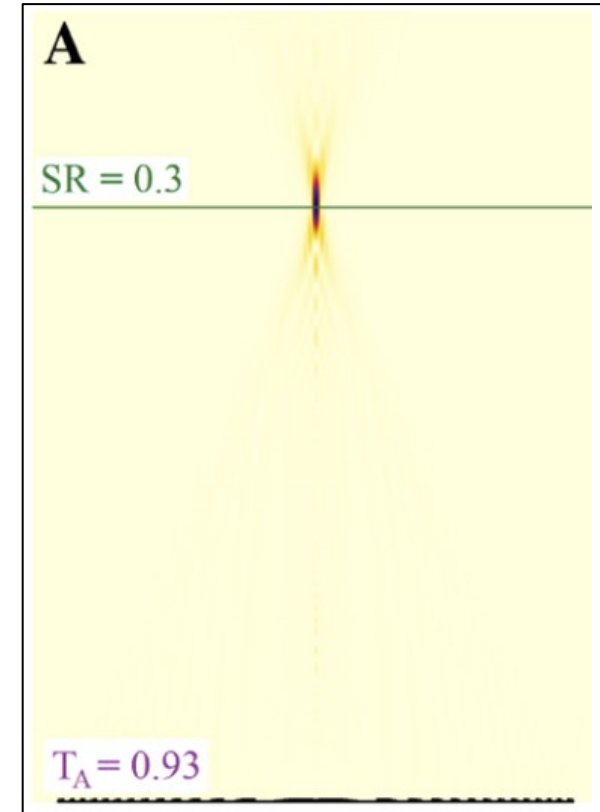
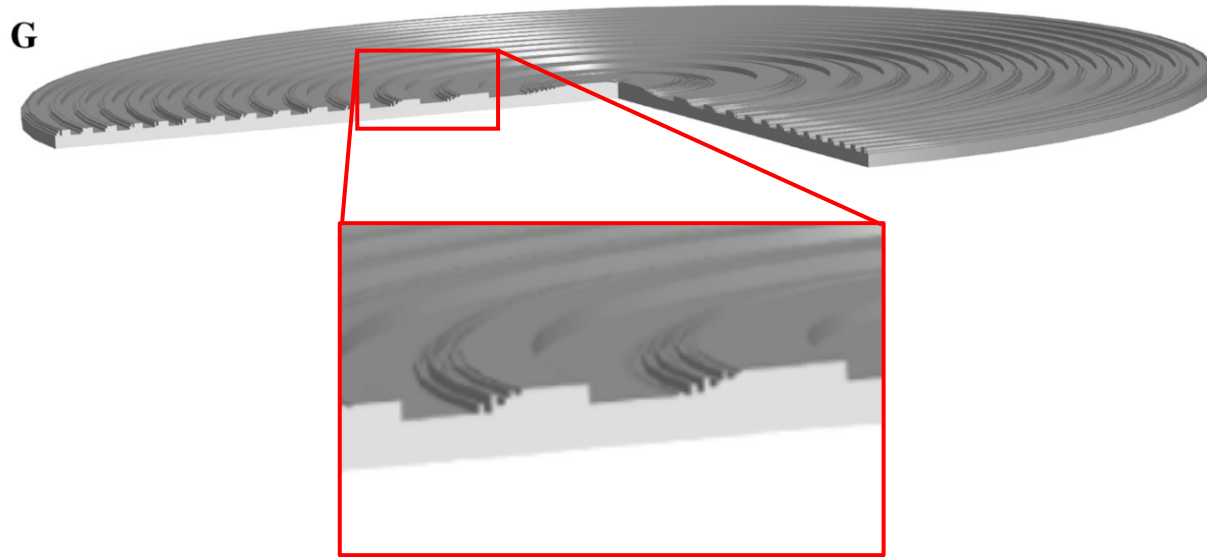


Pattern transfer to silicon through oxidation



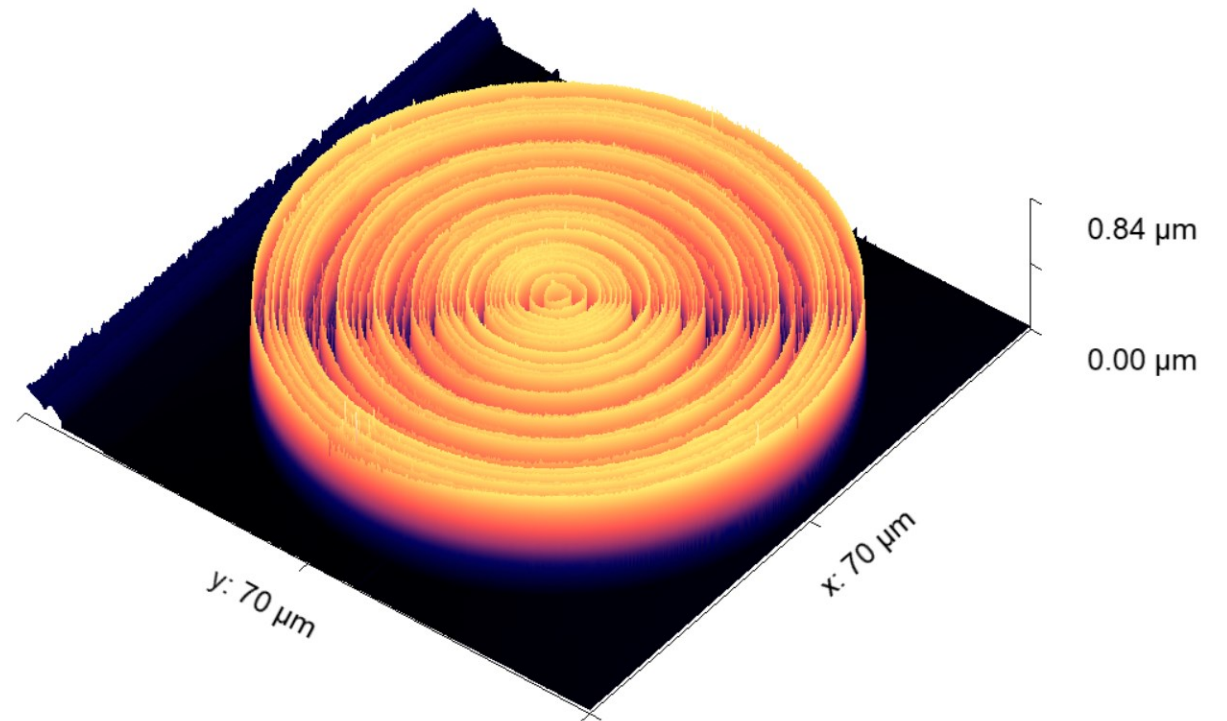
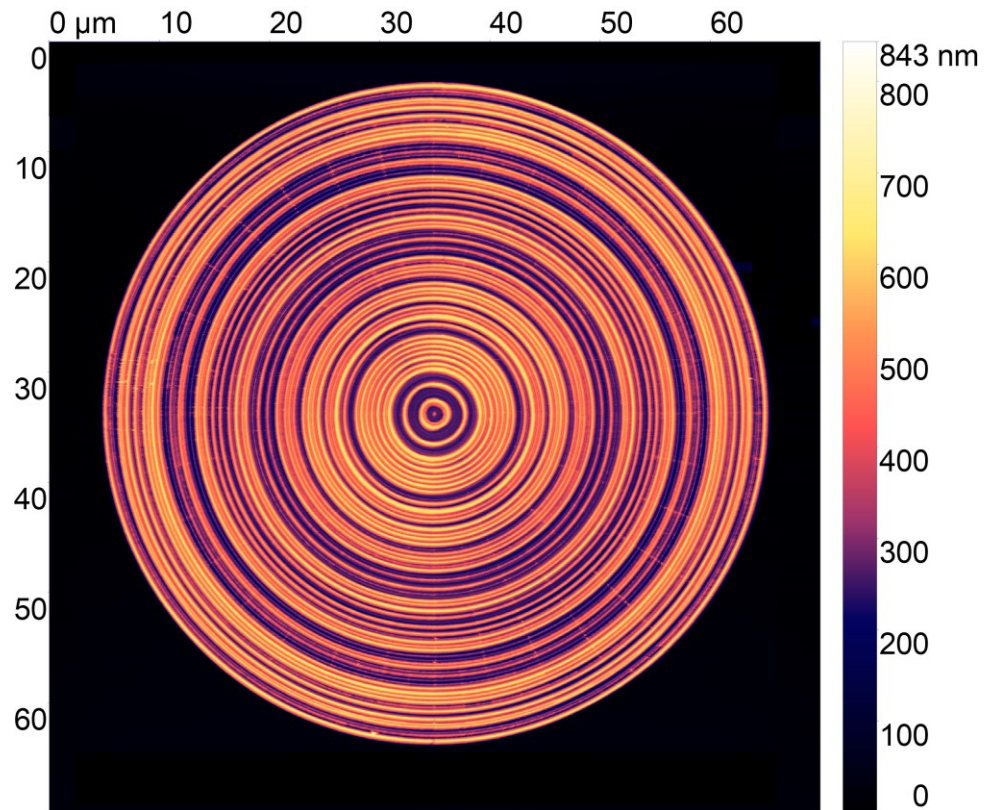
C. David and V. Guzenko, "Fabrication of Blazed Diffractive Optics by Through-Mask Oxidation," U.S. Patent 20 220 299 685 A1, Sep. 22, 2022.

Topology-optimized photonic metalenses

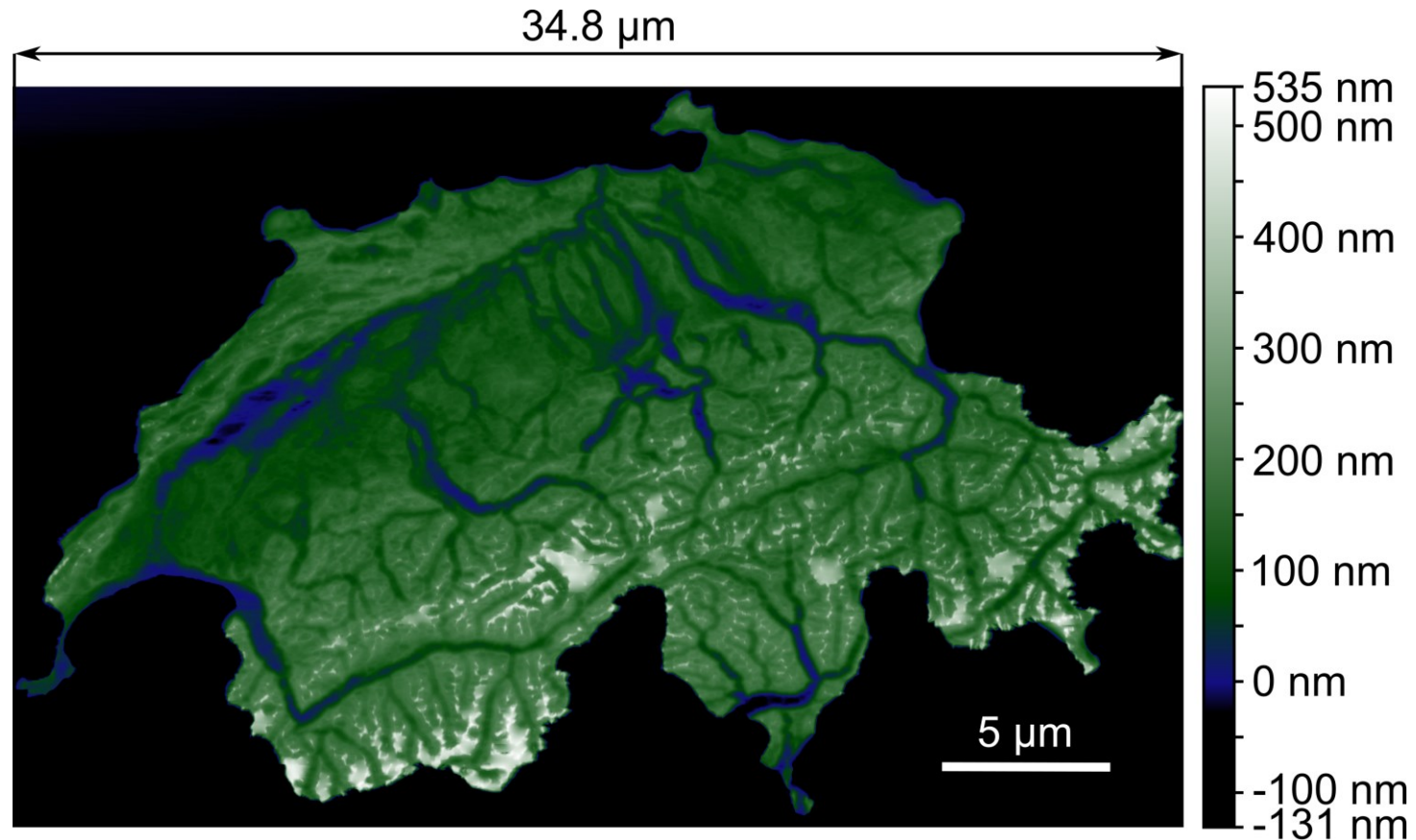


Rasmus E. Christiansen, Zin Lin, Charles Roques-Carmes, Yannick Salamin, Steven E. Kooi, John D. Joannopoulos, Marin Soljačić, and Steven G. Johnson, "Fullwave Maxwell inverse design of axisymmetric, tunable, and multi-scale multi-wavelength metalenses," Opt. Express 28, 33854-33868 (2020)

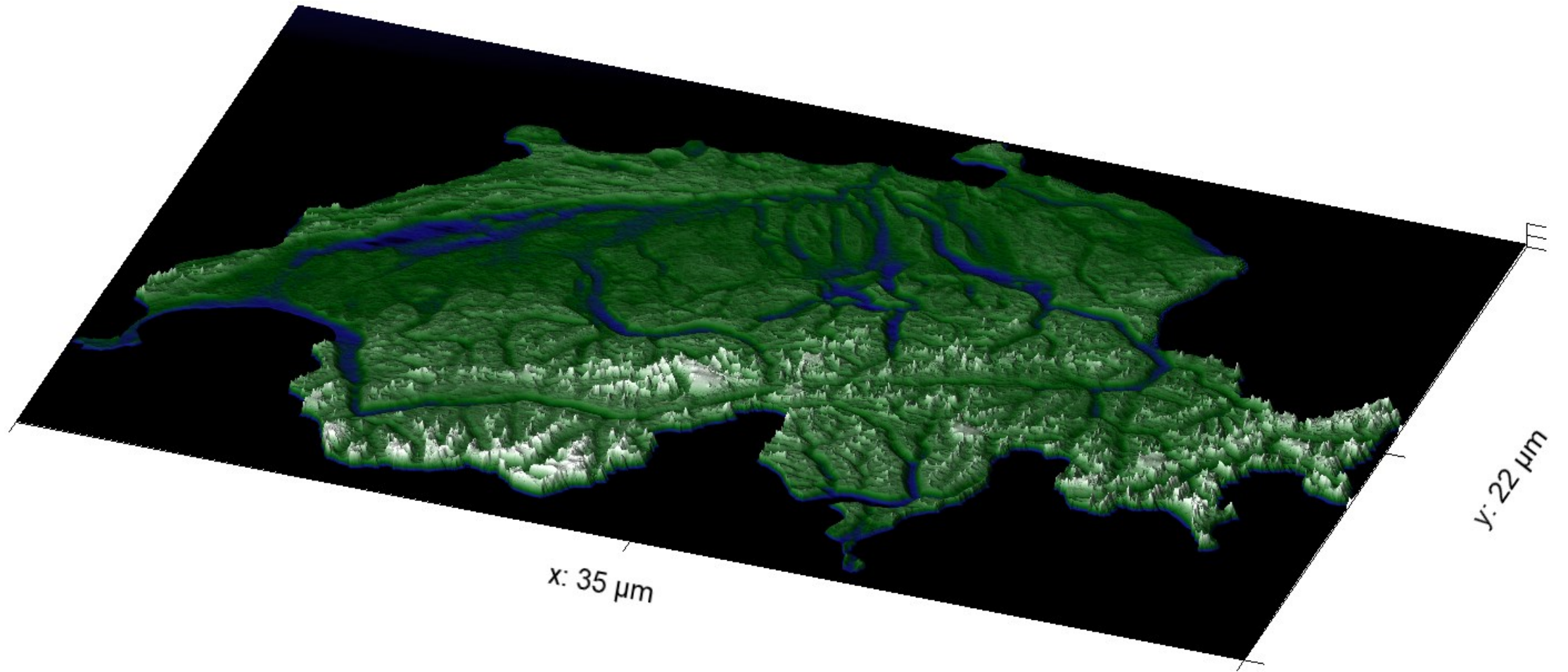
Metalens in SiO₂



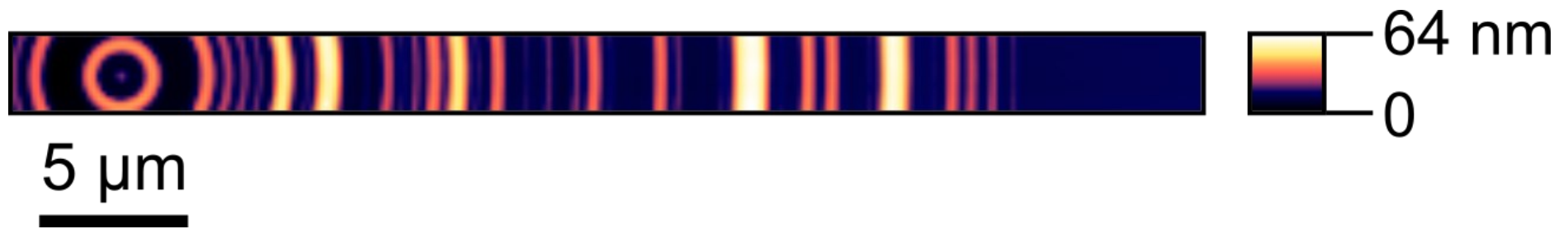
1:10¹⁰ height map of Switzerland in SiO₂



1:10¹⁰ height map of Switzerland in SiO₂



Metalens in silicon



Checkerboards in silicon

