Simulation of Nonlinear Interactions in GeSbS Chalcogenide Microcavities

Samuel Huertas Rojas1[1*], Samuel Serna Otálvaro[2], Camilo Hurtado Ballesteros[1], Rafael Angel Casalins Hernadez[1]

[1]Universidad Nacional de Colombia, Sede Medellín; [2] Department of Physics, Photonics and Optical Engineering, Bridgewater State University, Bridgewater, Massachusetts 02324, United States

**corresponding author: shuertasr@unal.edu.co*

Microcavities are fundamental elements in the development of advanced photonic technologies. For more than a decade, they have been considered as an emerging technology with a high potential that has the potential to solve key challenges in the design of optical sensors, as well as in the development of nanophotonic and quantum devices [1][2]. In this context, the present work explores the use of the chalcogenide material GeSbS as a medium for the fabrication of micro cavities, highlighting its nonlinear properties and its suitability for the production of high-performance waveguides [3]. Considering the inherent advantages of this material for photonic applications, we performed numerical simulations of various one-dimensional (1D) micro-cavities, composed of periodic structures of equidistributed holes. The target of this paper is to evaluate the optical behavior of different geometries and to determine those with the highest quality (Q) factors, in order to establish optimal design criteria for future experimental implementations.

References

[1] W. B. Veldkamp, *Proc. SPIE* **1544**, 287 (1991).
[2] H. Kim, B. S. Song, T. Asano, and S. Noda, APL Photonics **8**, 12 (2023).
[3] S. Serna, H. Lin, C. Alonso-Ramos, A. Yadav, X. Le Roux, K. Richardson, et al., Photon. Res. **6**, B37 (2018).