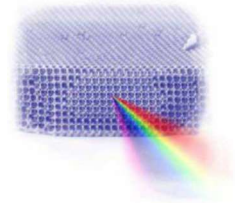


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Book of Abstracts
15th Photonics Workshop
(Conference)



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Numerical modeling of new oxide-based heterostructures for use in QCL devices

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Abstract. Semiconductor devices operating in the terahertz (THz) and near/mid infrared (IR) parts of the optical spectrum have been continuously explored and improved during the previous two decades [1-3]. Multiple new material platforms are being experimentally and theoretically investigated as candidates for room temperature operation of THz devices. One of the materials under recent consideration is ZnO due to its wide direct bandgap and high exciton binding energy. In this contribution we illustrate the use of a modified version of the Newton-Raphson method to numerically and self-consistently solve a system of Schrödinger-Poisson equations for a structure consisting of coupled ZnO-based quantum wells. The results obtained are compared with the experimental data available in the literature, after which the influence of layers' thickness and doping profile on the bound states energies is analyzed. Additionally, the impact of the external electric field applied to the structure is assessed in order to determine the doping profile and well/barrier thicknesses that would be most promising for quantum cascade laser applications. Finally, we evaluate the absorption due to intersubband transitions between the bound states.

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