Saurav Kar
Graduate Student
Department of Materials Science and Engineering
Virginia Polytechnic Institute and State University

“Effect of Out-Tunneling Leakage on Modulation Bandwidth in Double Tunneling-Injection Quantum Dot Lasers”

ABSTRACT

The effect of out-tunneling leakage of carriers from quantum dots (QDs) in limiting the modulation bandwidth in double tunneling-injection (DTI) QD lasers is analyzed. To purely focus on this effect, the conditions of instantaneous carrier exchange between the optical confinement layer and the quantum wells (QWs) (on each side of the structure) and instantaneous tunneling-injection from the QWs into QDs are assumed. The relative variation in the modulation bandwidth due to out-tunneling leakage is shown to be small, and, at ranges of injection currents of operational interest, nearly negligible. Consequently, it is shown that the DTI QD laser is a robust device in terms of insensitivity to out-tunneling leakage, i.e., there is no need to put much effort into suppressing this process.

BIOSKETCH

Saurav Kar is an M.S. candidate in the department of Materials Science and Engineering (MSE) at Virginia Tech. He received his B.S. degree in Metallurgical and Materials engineering from the National Institute of Technology, Durgapur, India, in 2015 before joining Virginia Tech in the fall that year. He interned with CSIR Central Glass and Ceramics Research Institute (an Indian Government lab) in 2013, and was awarded the Tata Steel Mind Over Matter innovation award in 2014. His research interests also include crystallography and texture analysis and advanced ceramics.