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Effect of Waveguide Side-Wall Roughness on Quantum Cascade Laser Performance FATIMA TOOR, HAO LIU, Princeton University, DEBORAH SIVCO, Alcatel-Lucent, CLAIRE GMACHL, Princeton University — Waveguide loss in optical devices can be attributed to two main factors, intrinsic material loss (e.g. free carrier absorption) and scattering loss from imperfections (e.g. fabrication errors). To-date most work for determining the waveguide loss of quantum cascade lasers (QCLs) is concentrated on determining the intrinsic material loss, but there is very little research work done on determining the effect of fabrication errors such as side-wall roughness on QCL performance. Here we report on an experimental and modeling study to determine the effect of side-wall roughness on QC laser performance. The work involved designing and fabricating waveguides with different amounts of side-wall roughness. Measurements were then taken to determine the effect of waveguide side-wall roughness on laser performance parameters like threshold current density and slope efficiency.

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