also observed when the pumping length is increased. This dependence corresponds also to the expected behavior when optical gain is present.

4. Conclusion

We have introduced a new method to impose a tensile stress on germanium and succesfully fabricated tensile-strained germanium photonic wires using Si_3N_4 straining layers. The tensile-strained layer exhibits a room temperature luminescence shifted by more than 120 nm from the bulk germanium. Optical gain has been evidenced at room temperature under cw optical pumping through the variable strip length method and the decrease of the broadening as the pump intensity or pumping length are increased. The observation of optical gain is a direct consequence of the applied tensile strain. The demonstration of optically active tensile-strained germanium wires opens new perspectives for the integration of compact optical sources on silicon and the study of novel nanoscale photonic elements [28, 29], similarly to the studies performed on nanowire lasers [30–32].

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