

3. DEVICE REALIZATIONS

Examples of III-V-on-silicon device realizations are shown in Figure 1. The applications of such devices are not limited to optical communication: especially in the field of integrated optical sensors (gas sensors, lab-on-a-chip, ...) there is a great interest for such devices. This typically necessitates operating at wavelengths outside the classical telecommunication window. Examples include the realization of III-V-on-SiN VCSILs operating at 850 nm wavelength (for reading out SiN biosensors, see Fig. 1(top)) and 2 μm wavelength range tunable lasers (for spectroscopic gas sensors, see Fig. 1(middle)). Also, the integration of III-V optical amplifiers on silicon waveguide circuits enables the realization of high performance laser sources in the telecommunication wavelength range, taking advantage of the low silicon waveguide loss (~ 0.5 dB/cm) and high-quality silicon photonic optical filters. An example of this is a III-V-on-silicon modelocked laser with low repetition rate, necessitating long optical cavities (see Fig. 1(bottom)).

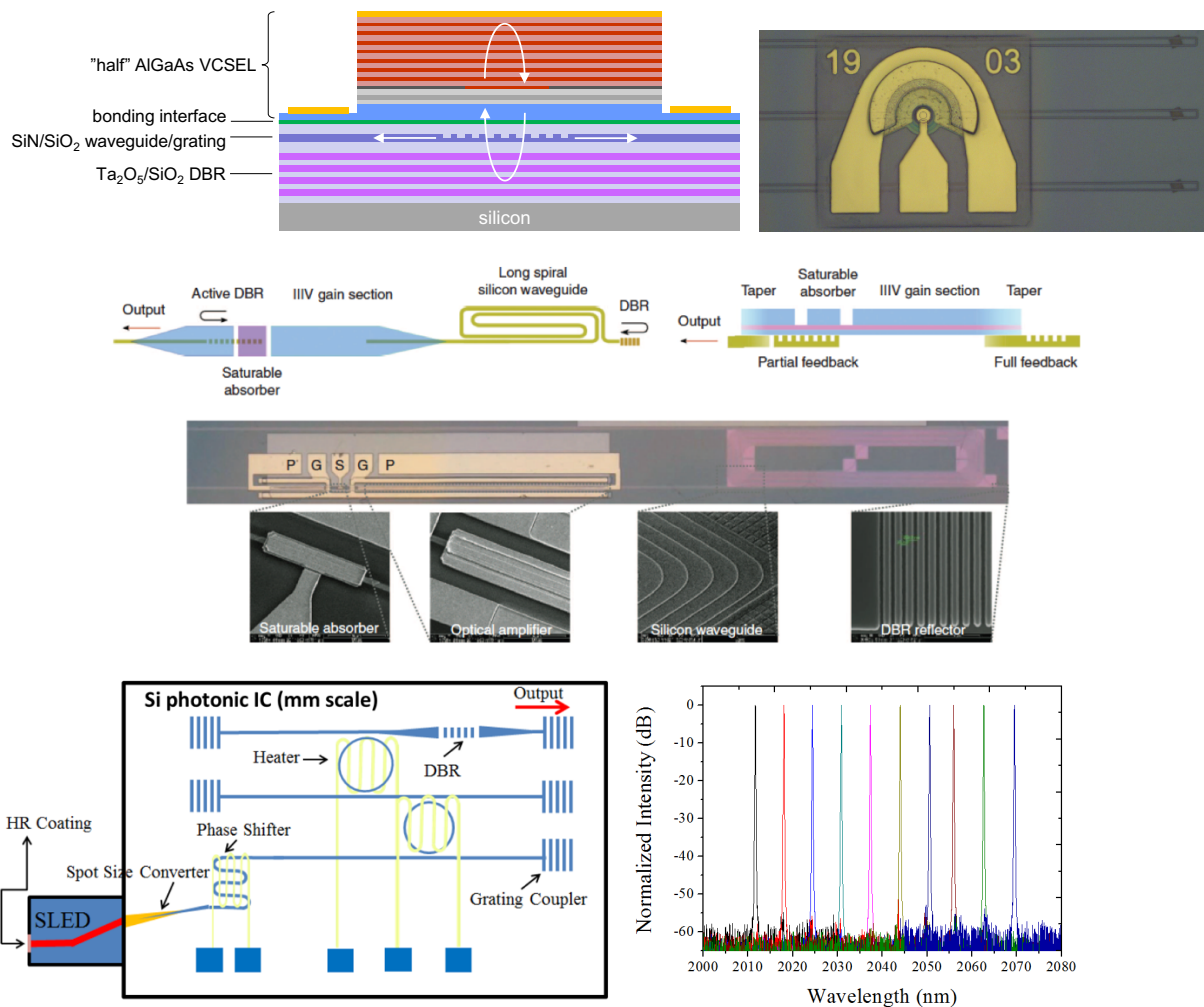


Fig.1 Top: Cross-section of the VCSIL showing the hybrid-vertical-cavity and the intra-cavity waveguide/grating for in-plane emission and microscope image of a VCSIL with the intra-cavity waveguide and one of the grating outcouplers visible. **Middle:** III-V-on-silicon modelocked lasers with 1 GHz repetition rate. **Bottom:** 2. μm GaSb/Si widely tunable laser with 60 nm tuning.