

Title: Hybrid III-V on silicon lasers and photodetectors with nano-structures.

Abstract:

Lasers and detectors that can be monolithically integrated onto a silicon wafer is not only a key element for chip-level optical interconnects (communication application), but also an enable element for disease-diagnosis chips, compact 3D-depth sensor chips, and quantum photonics chips. In this lecture, it will be firstly discussed how nano-photonic structures of which resonance is above the light line can be used to manipulate various properties of optical micro-cavities. Then, various novel devices realized on silicon platform will be discussed, which employ the understanding and new findings on the nanophotonic structure. These include the record-high speed demonstration from a silicon-on-chip laser, the first demonstration of a bound-state-in-the continuum laser from an 1D photonic structure, the first demonstration of a hybrid resonant cavity photodetector, and a complete-absorption all-silicon photodetector at telecom wavelengths.