

## Long Wavelength GaInNAs Based Hot Electron Light Emission VCISOAs

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**Abstract :** Optical, electrical and optical-electrical characterisations of surface light emitting VCISOAs devices are reported. The hot electron light emitting and lasing in semiconductor hetero-structure vertical cavity semiconductor optical amplifier (HELLISH VCISOA) device is a surface emitter based on longitudinal injection of electron and hole pairs in their respective channels. Ga<sub>0.35</sub>In<sub>0.65</sub>N<sub>0.02</sub>As<sub>0.08</sub>/GaAs was used as an active material for operation in the 1.3 μm window of the optical communications. The device has undoped Distributed Bragg Reflectors (DBRs) and the current is injected longitudinally, directly into the active layers and does not involve DBRs. Therefore, problems associated with refractive index contrast and current injection through the DBR layers, which are common with the doped DBRs in conventional VCISOAs, are avoided. The highest gain of around 4 dB is obtained for the 1300 nm wavelength operation.

**Keywords :** HELLISH, VCISOA, GaInNAs, luminescence, gain

**Conference Title :** ICSR2020 : International Conference on Scientific Research and Development

**Conference Location :** Chicago, United States

**Conference Dates :** December 12-13, 2020