ELECTRONIC MATERIALS TECHNOLOGY NEWS

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Race to Mid-IR Laser Emission Tightens

Advances in research into laser emission at mid-infrared (IR) wavelengths have recently been reported by groups at two U.S. institutions. A team of scientists from the University of Houston's (UH) Space Vacuum Epitaxy Center (SVEC) and Sandia National Laboratories have demonstrated 4.2 micron laser emission from antimonide-based materials while touting the development of the world's first type-II quantum cascade (QC) laser. In Illinois, meanwhile, researchers at Northwestern University's Center for Quantum Devices (CQD) are teasing 3.6 micron laser emission from similar antimonide-based materials.

At Northwestern, the CQD, under the direction of Professor Manijeh Razeghi (MLSB Room 4051, 2225 N. Campus Dr., Evanston, IL 60208; Tel: 847/491-7251, Fax: 847/467-1817), is using InAsSb and InAsSbP materials to make double heterostructures (DH) and multiple quantum well (MQW) structures. The materials have desirable, type I, bandgap alignment and optical confinement features.

DH and MQW laser structures were grown on InAs substrates using a metal-organic chemical vapor deposition (MOCVD) system from EMCORE Corp., the reported use of MOCVD for this type of work. The resulting 3.6 micron laser device had an output power of 1 watt at 90 K and a differential efficiency above 80%. The maximum operating temperature was reported to be 220 K under pulse operation.

Mid-IR optical systems, operating within the 3 to 5 and 8 to 12 micron atmospheric windows, are in demand for a number of military, space, and commercial applications. These include IR counter measures, covert illumination for night vision, free-space communication, collision avoidance, and many medical procedures. Laser in the 3 to 5 micron range could also monitor many industrial, greenhouse, hazardous, and toxic gases.