Researchers demonstrate 100-watt-level mid-infrared lasers

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Northwestern University researchers have achieved a breakthrough in quantum cascade laser output power, delivering 120 watts from a single device at room temperature.

The results are particularly attractive for infrared countermeasure, a way of misguiding incoming missiles to protect commercial and military aircrafts.

The research, led by Manijeh Razeghi, Walter P. Murphy Professor of Electrical Engineering and Computer Science at the McCormick School of Engineering and Applied Science, was published in the journal Applied Physics Letters on Dec. 1.

Unlike conventional interband semiconductor lasers, such as those used in DVD players, the quantum cascade laser (QCL) is an intersubband device that requires only electrons to operate. Because of this fundamental difference, a QCL shows unique properties that a conventional laser lacks. One of these properties is that the linewidth enhancement factor of a QCL is close to zero, compared to two to five for a conventional laser. This difference has serious implications in terms of power scaling with broad-area devices.

Researchers at the Center for Quantum Devices at Northwestern, led by Razeghi, found that the QCL is exceptionally resistant to filiamentation, a phenomenon that limits the ridge width of conventional broad-area semiconductor lasers. In this work, Razeghi's team demonstrated that the

ridge width of a broad-area QCL can be increased up to 400 microns, without suffering from filiamentation. As a result, room temperature peak output power as high as 120 watts was obtained from a single device, which is up from 34 watts only a year ago.

Source: Northwestern University (news : web)