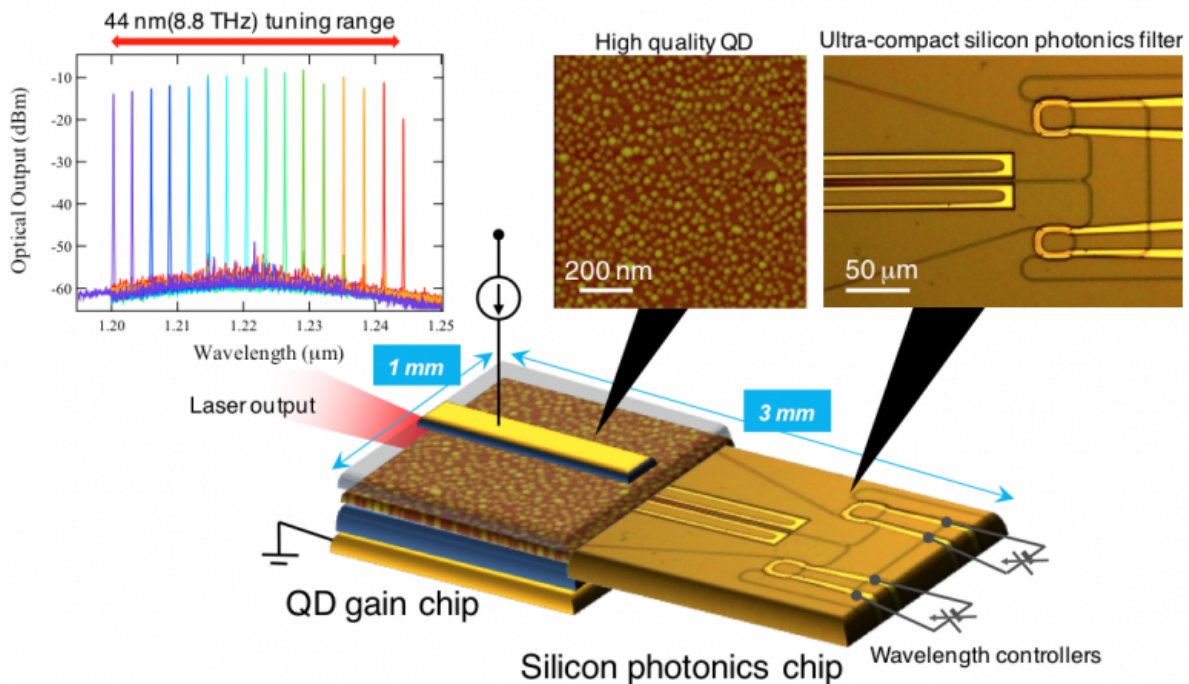


New heterogeneous wavelength tunable laser diode for high-frequency efficiency

June 2 2015



The novel heterogeneous wavelength tunable laser diode consists of QD technology and silicon photonics. Credit: Tomohiro Kita

Researchers at Tohoku University and the National Institute of Information and Communications Technology (NICT) in Japan, have developed a novel ultra-compact heterogeneous wavelength tunable laser diode. The heterogeneous laser diode was realized through a combination of silicon photonics and quantum-dot (QD) technology, and

demonstrates a wide-range tuning-operation.

The researchers presented their work at a Conference on Lasers and Electro-Optics (CLEO) in San Jose, California, on May 13. The related paper was also published in *Applied Physics Express* vol. 8, 062701 on May 20.

Recent high-capacity optical transmission systems are based on wavelength-division multiplexing (WDM) systems with dense [frequency](#) channels. The frequency channels in C-band (conventional band: 1530-1565 nm) are overcrowded and the frequency utilization efficiency is saturated in such WDM systems. On the other hand, extensive and unexploited frequency resources are buried in near-infra-red wavelengths (1000-1300 nm). Additionally, photonic devices are required to have smaller footprints and lower power consumption in short-reach data transmission. The compact and low power consumption wavelength [tunable laser](#) diode is a key device to tap the undeveloped frequency bands for higher capacity data transmission systems.

The heterogeneous wavelength tunable [laser diode](#), consisting of the QD and the [silicon photonics](#), is a promising candidate to realize such a compact and broad-band light source. This is because the QD has large optical gains of around 1000 -1300 nm wavelength, and [silicon](#) photonics provide a promising platform for highly integrated photonics devices - so a novel wavelength-tunable laser diode, combining QD and silicon photonics technologies, was proposed.

The cooperative research group led by Tomohiro Kita and Naokatsu Yamamoto demonstrated a wide range tuning operation of around 1250 nm wavelength with an ultra-small device footprint. The obtained frequency tuning-range of 8.8 THz is a world record for the category of QD and silicon photonics heterogeneous wavelength tunable laser diodes. It is expected that the fusing of the QD technology and silicon

photonics will provide a breakthrough for the development of an effective and compact light source.

Provided by Tohoku University

Citation: New heterogeneous wavelength tunable laser diode for high-frequency efficiency (2015, June 2) retrieved 2 May 2024 from <https://phys.org/news/2015-06-heterogeneous-wavelength-tunable-laser-diode.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.