●研究紹介

DYCE
Optical Science of Dynamically Correlated Electrons

Lasing Characterization of Highly Uniform T-shaped Quantum Wires

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T shaped quantum wire (T-wire) is one of the quantum structures that are very helpful in studying the novel properties due to the reduced dimensionality. Recent progresses in MBE growth technique[1] have realized successful fabrication of very high quality multiple T-wires with the period as much as 100.

The upper part of Fig.1 shows the schematic structure of a 100 period T-wire laser with the cavity length around 500 μm. 100-periods of T-wires(6nm×14nm) are embedded in a T-shaped optical waveguide (0.18 μm×5 μm). The bottom figure of Fig1 shows the lasing spectra of the T-wire laser at the excitation power of 175mW. The laser shows single mode lasing with the threshold power of around 60mW by CW optical excitation at ~5K, which suggests a very good lasing performance of the 100-period T-wires. The emission pattern of the T-wire laser (inset of the bottom figure) indicates that the optical mode is well confined in the waveguide.

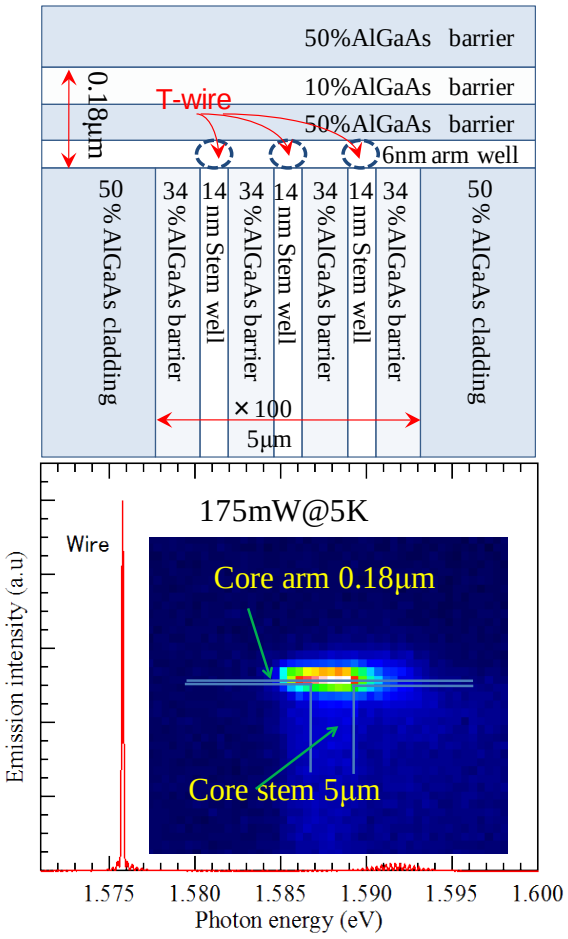

Fig.1

In this project, after the systemic lasing characterization of 100-period T-wires laser, carrier dynamics and the carrier relaxation processes in the T-wire laser will be investigated by Time-resolved Photoluminescence measurements by using pulse excitation. On the other hand, I am also planning to study short pulse generation by Gain-Switching from T-wires and other semiconductor laser structures and investigate its physical mechanism by using pulse laser.

Reference

[1]　H. Akiyama, M. Yoshita, L N. Pfeiffer and K W. West. J.phys.:condens.Matter16(2004)S3549-S3566.

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