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Department of Physics and Technology of Low-Dimensional Structures

Wide Aperture Coherent Laser Diodes for Erbium Doped Fibre Amplifiers, WILD IST-1999-10787

COORDINATOR

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- University of Cambridge, Cambridge, United Kingdom
- University of Ulm, Ulm, Germany
- Nortel Networks, United Kingdom
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- Institute of Electron Technology, Warsaw, Poland

PROJECT DESCRIPTION

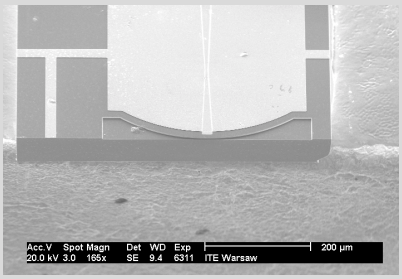
The project goal is to develop high power, wide aperture semiconductor lasers with lateral coherence suitable as a pump sources for erbium doped fibre amplifier telecommunication systems. We will develop models and simulations of the underlying physical mechanisms appropriate to high injection conditions. Novel device geometries which allow active control of transverse mode and filamentation properties of the laser diode are investigated in the project. With the unstable resonators formed by reactive ion etching of laser mirrors we want to promote a fundamental mode by creating higher loss for the higher order modes. Spatially coherent laser output is necessary to allow efficient coupling of that light to small core diameter single mode fibres used in optical fibre communication systems. A novel approach to achieve compact packaging of wide aperture devices to single mode fibre will be developed. Lasers will be assessed in a fibre amplifier test bed.

OUR ROLE IN THE PROJECT

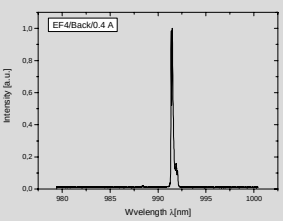
The objective is to provide experimental analysis of the mechanisms of degradation associated with etched facets in semiconductor lasers. A thermoreflectance technique to monitor the temperature distribution over the laser facet will be developed and used to assess device performance and reliability.

RESULTS

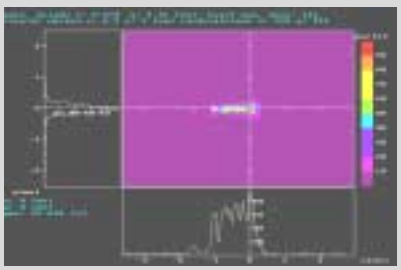
Experiental set-up for micro-thermoreflectance mapping



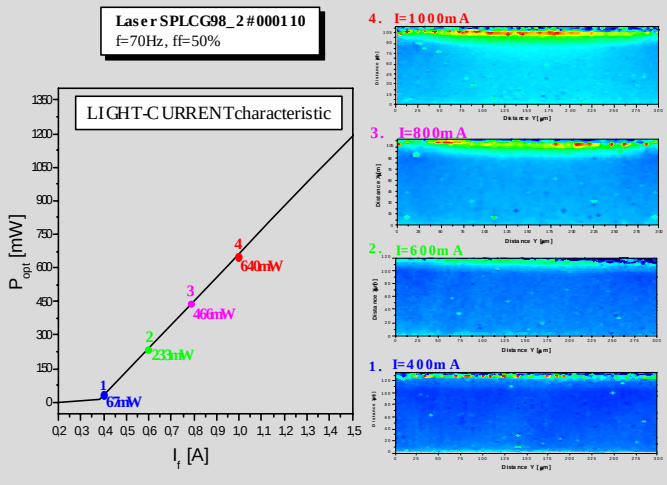
SEM view of unstable resonator laser with chemically assisted ion beam etched (CAIBE) rear mirror and controlled current injection



Emission spectrum of InGaAs laser with unstable resonator



Near-ield image of the unstable resonator laser



Light-current characteristic of the unstable resonator laser and maps of the temperature distribution over the laser facet for different values of supply current. Facet heating occurs mainly in the vicinity of active region and is generally well below COD level. No localized heating at defects is observed, which proves that etching process does not introducefacet damage.

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