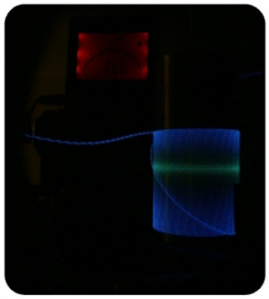
INTEGRATED DISRUPTIVE COMPONENTS FOR 2 µM FIBRE LASERS

ISLA

www.isla-project.eu

Objectives

- Develop a set of "building block" components for 2 µm fibre lasers
  - Define an integrated modular common platform
  - Family of compatible fibres for Tm and Ho fibre lasers
  - Isolators and modulators
  - Carbon nanotube modelockers
  - Optimised laser diodes
- Laser types under development
  - High power CW SM
  - Q-switched pulsed
  - Sub-ps MOPA with amplifier
- Industrial demonstration applications
  - Transparent plastic cutting
  - PV cell scribing.



Why 2 µm?

- 2 µm fibre laser technology has the potential to open whole new areas of ICT & industrial applications
- Power scaling
  - Higher non-linear thresholds
  - Tenfold increase in "raw power" compared with current technology
- Wavelength-specific advantages
  - Eye-safe
  - Almost unexplored spectral region
- Many potential applications
  - Free-space communications
  - Medical procedures
  - Gas sensing
  - Mid-IR generation.

Consortium

Gooch & Housego

Gooch & Housego

ORC Southampton

TRINITY COLLEGE DUBLIN, COLÁISTE NA TRÍONÓIDE, BAILE ÁTHA CLIATH, THE UNIVERSITY OF DUBLIN

Trinity College Dublin

oclaro

Oclaro Switzerland

rofin

ROFIN Sinar Laser

Time-Bandwidth

Time-Bandwidth Products

VIVID COMPONENTS

Vivid Components

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SEVENTH FRAMEWORK PROGRAMME

INTEGRATED DISRUPTIVE COMPONENTS FOR 2 µM FIBRE LASERS

ISLA

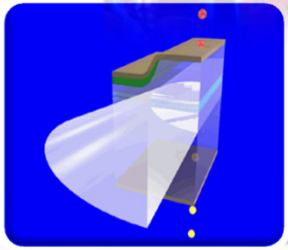
Rare-earth-doped fibres

•The ISLA project will develop:

–Tm- and Ho-doped fibres optimised for efficient amplification at 2 µm

–Ho-doped fibres optimised for in-band pumping with Tm fibre lasers as route to low quantum defect, ultra-high power fibre lasers.

Laser pump diodes



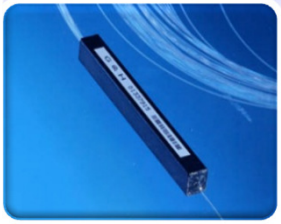
•Oclaro will develop 79x nm diodes optimised for cladding pumping Tm-doped fibre lasers

–Wavelength stabilisation

–Increased chip efficiency

–Higher output power density.

Fused fibre components



•Optimised fused fibre components for high power 2 µm fibre lasers

–Pump combiners

–WDMs

–Taps.

Fibre-coupled bulk optic components

•Fibre-coupled bulk optic components for integration into fibre lasers including:

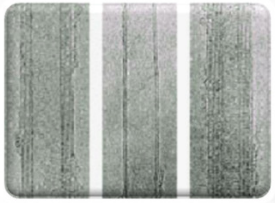
–Isolators

–Acousto-optic modulators

–Acousto-optic tuneable filters

–Integrated components.

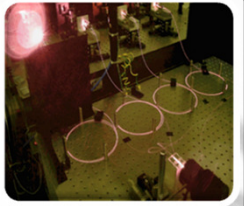
Carbon nanotube modelockers



•Develop carbon nanotube based saturable absorbers

•Passive modelocking of ultrafast 2µm fibre lasers.

Fibre lasers

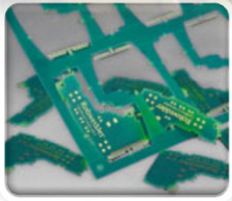


•The developments made in the ISLA project will be integrated in three demonstration lasers:

–500W CW Ho-doped fibre laser

–20W 10mJ Ho-doped Q-switched fibre laser

–100W ps Ho-doped MOPA



•These lasers will be used for demonstration in industrial environments

–Cutting of transparent plastics

–Photovoltaic materials for solar cells.