NEWSLETTER LIFT #8
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APPLICATION ORIENTED RESEARCH IN THE AREA OF HIGH-BRILLIANCE FIBRE LASERS

Contents of this newsletter:

LIFT holds Fibre Laser Workshop at iXFiber in Lannion, France, 12 July 2011

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Sixty-three professionals coming from 7 EU countries met in Lannion for the LIFT Project workshop on fibre lasers. The programme (see below), consisted of 20 presentations and was split into 3 sessions. The lunch and the "crêpes & cidre" party facilitated networking between participants and discussions with partners of similar European Commission-funded projects (e.g. Quanta / ALPINE).

Joël Le Jeune, President of Lannion Tregor Agglomeration, Benoît Cadier, CEO of iXFiber welcomed the participants in the Lannion region and introducing the workshop.

Professor J. Nilsson (ORC)

LIFT has a core vision that the pathway to higher brilliance is to design components that can handle higher levels of optical power. However managing the total optical power so that individual components and systems do not suffer damage requires R&D to improve reliability. Prof. Johann Nilsson of the Optical Research Centre at the University of Southampton opened the workshop with a 45 min invited paper describing the state of the art and the recent developments on high power fiber lasers.

The session 1 concerned the description of the fiber specifications needed by laser manufacturers for covering a wide range of applications, medical, defense, industrial, scientific, etc, with many types of fibe lasers, continuous or pulsed (ns, fs) regime, visible, near- or mid-infrared. Seven topics were presented:

•*cw high-power infra red lasers (U. Hefter, Rofin)*
•*cw visible lasers for medical applications (M. Jacquemet, Quantel)*
•*Picosecond pulsed lasers (F. Salin, Eolite)*
•*Femtosecond high peak power lasers (Y. Zaouter, Amplitude Syst.)*
•*Blue solid-state lasers (N. Traynor, AzurLight Syst.)*
•*2 µm lasers for sensing (G. Canat, ONERA)*
•*Fibre laser development at Thales (E. Lallier, Thales)*

The session concluded with a general discussion concerning performance requirements from fibre laser manufacturers.

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Session 2 focused on the photodarkening effect and opened a debate on the fundamental mechanism of the phenomenon. The proposal from Stefano Taccheo (Swansea University) to define a protocol for photodarkening characterization and to implement a figure of merit parameter for specialty fibers was discussed. Six topics were presented:

•*Color centers in silica –a review (S. Girard, CEA)*
•*Photo-induced processes in glass (T. Cardinal, ICMCB)*
•*Advances in Photodarkening measurement (S. Taccheo, U. Swansea)*
•*Advances in understanding the Photodarkening mechanism (D. Milanese, Politecnico diTorino)*
•*Thermally stimulated luminescence (M. Benabdesselam, U. Nice)*
•*Radiation resistance of silica fiber (M. Vivona, iXFiber)*

The presentations were followed by a general discussion on standardisation of fibres with respect to photo-darkening.

Workshop attendees participating in the discussion about standards development for photodarkening in fibres.

Session 3 described various fabrication processes used or developed by industrial manufacturers and R&D laboratories to fabricate preforms for specialty active fibers. Influence of the glass composition and the manufacturing process (powder, sol-gel, sand, vapor-phase, etc.) on the fiber performance were presented and discussed in details. Seven different topics were presented:

•*Manufacturing technology – a review (D. Méchin, PERFOS)*
•*Technology - Powder (G. Schötz, Heraeus)*
•*Technology – Sand (E. Friedrich, Silitec)*
•*MCVD nanoparticles (L. Gasca, Draka)*
•*MCVD chelates (B. Lenardic, Optacore)*
•*Single-mode fiber designs for high power applications (T. Alkeskjold, NKT-P)*
•*Recent advances in Fiber design (P. Roy, XLim)*

Denis Tregoat (PERFOS) wrapped up the workshop with a synthesis of the main results:

- Looking at the laser manufacturer side, it appears that there is not a unique and standard fiber that can fulfill all the needs. Each manufacturer is specialized in a specific application field which requires either cw, ps or ns, medium or high power, visible, near-IR or mid-IR fiber lasers.

- Concerning the fibre fabrication technology, it seems that the first parameter influencing the photodarkening is the glass composition and that other processing parameters have little or no influence on photo-darkening but are important with respect to other fabrication aspects, e.g. control and homogeneity of the refractive index, realization of large mode area or rod-type fibers, etc.

- Concerning photodarkening, an agreement on the implementation of a figure of merit parameter seems to be attainable and could be adopted at the next LIFT general assembly in October, 2011.

Denis Trégoat of PERFOS proposed a synthesis of the the day's results, prior to the the Cider and Crêpes networking reception that closed the workshop.

Since the LIFT project aims to support greater EU competitiveness and provide dissemination of its activity, Workpackage P6 in collaboration with Workpackage 3 organised the "1st International Workshop on Photodarkening in Optical Fibres" in Dresden in October 2010. This initiative was described in the LIFT Newsletter #3. The next LIFT technology workshop will be jointly organised with the ALPINE project and is scheduled to take place in Bordeaux on 29-30 September 2011.

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