



APPLICATION ORIENTED RESEARCH IN THE AREA OF
HIGH-BRILLIANCE FIBRE LASERS

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Report on the First
European Workshop on
Photodarkening in Gain
Fibres organized by LIFT
within the International
Symposium on Fibre and
Disc Lasers (FiSC2010)

**Summary of the LIFT 1st International Workshop on
Photodarkening in Gain Fibres**

www.lift-project.eu

October 5, 2010, International Congress Center Dresden

The **1st International Workshop on Photodarkening in Optical Fibres** took place on 5th October 2010 at the International Congress Centre in Dresden (D), in parallel with the **International Symposium on Fibre and Disc Lasers (FiSC2010)**.

**International LASER
Symposium** **Fi**^{ber}
Di **SC**

The workshop was organised by the European project **LIFT** (Leadership in Fibre Laser Technologies) with the intention of stimulating discussion within the scientific community on the causes and mechanisms of Photodarkening.



Speakers: Dr. Sylvia Jetschke , Dr. Daniel Milanese, Prof. Stefano Taccheo, Prof. Kazuya Saito, Dr. Kent Mattson

It was chaired by **Dr. Daniel Milanese** (Politecnico di Torino, Italy) and **Prof. Stefano Taccheo** (Swansea University, UK) and gathered main experts in the field in order to foster collaboration aiming at paving the way towards the development of photodarkening free optical fibres.

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Prof. Kazuya Saito (Toyota Technology Institute, Japan) focussed on the structural analysis of the induced defect centres that are created under irradiation with X-Rays and compared to the effect of optical fibre lasers pump photons.



Dr. Sylvia Jetschke from IPHT Jena, Germany proposed a reversible first order reaction model in order to describe the Photodarkening kinetics at a microscopic level; she also pointed out that particular care has to be taken in carrying out reliable measurements of Photodarkening, including a strict control of temperature, a low probe power and a measure up to saturation.



Dr. Kent Mattson (NKT, Denmark) suggested a phenomenological model for Photodarkening and described the mechanism both of color center formation and the physics of the color center. Codopants like cerium and phosphorus would act as scavengers of electrons and reduce Photodarkening.



The afternoon session featured a **rump session** involving several attendees and people from companies developing optical fibres and fibre lasers.

Main worries from the companies related to Photodarkening were the effect on the degradation of laser beam quality and an increase in risk of failure of the product: an induced Photodarkening requires higher diode pump power and scaling the energy supplied to the system increases the possibility of failure, due to the occurrence of "hot spots" in part of the components.

At the end of the session an agreement on the value of 2 % was considered as acceptable for Photodarkening induced degradation in fibres.

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Symposium audience