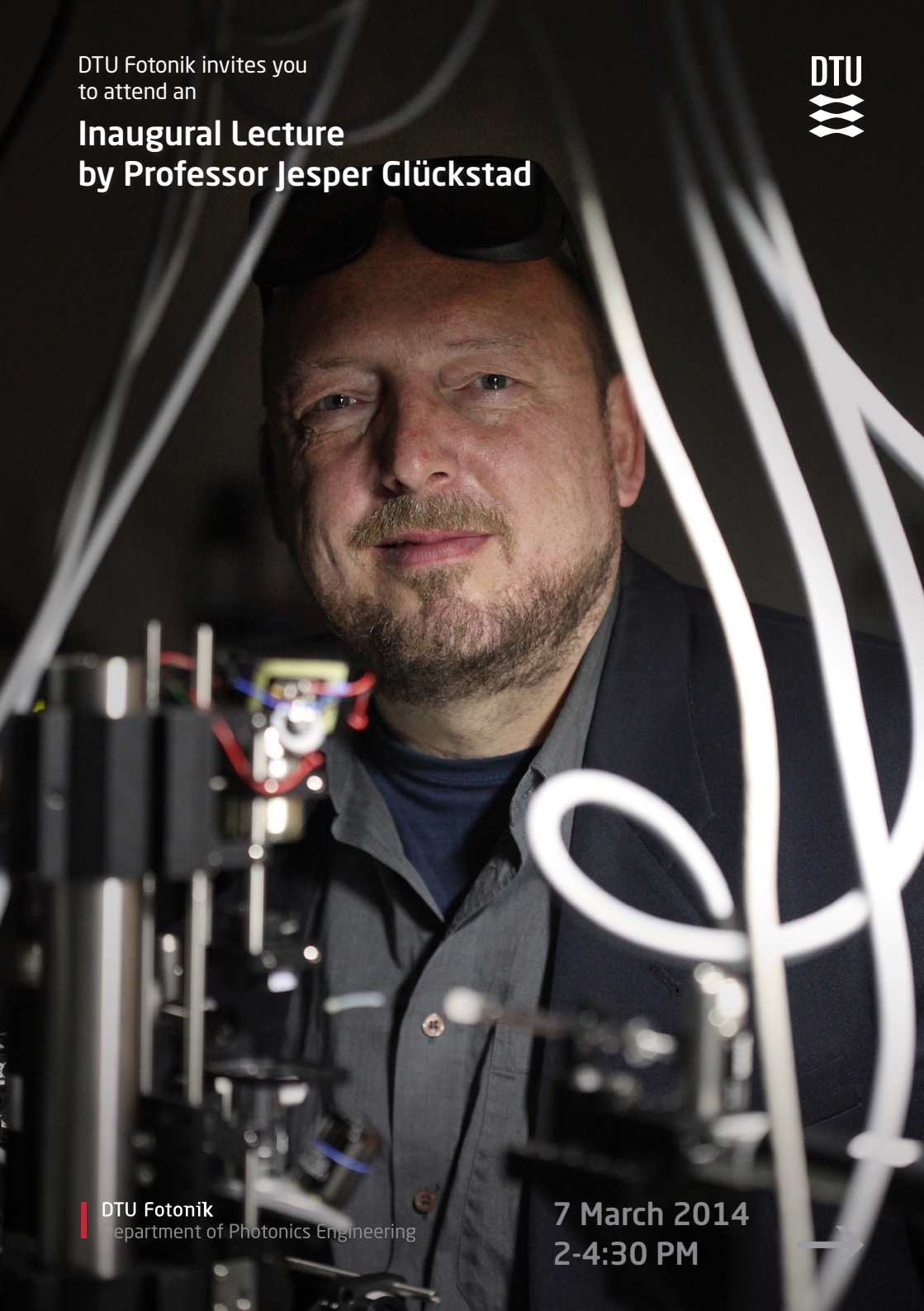

DTU Fotonik invites you
to attend an

Inaugural Lecture
by Professor Jesper Glückstad

DTU Fotonik
Department of Photonics Engineering

7 March 2014
2-4:30 PM

Topic: **Programmable Phase Optics for NanoBiophotonics**
When: **7 March 2014, 2-4:30 PM**
Where: **DTU building 101, Meeting room 1, 2800 Kgs. Lyngby**

Biography
Jesper Glückstad established the Programmable Phase Optics www.ppo.dk in Denmark more than a decade ago and currently holds a position as Professor at DTU Fotonik, Dept. of Photonics Engineering at the Technical Univ. of Denmark, and a 5-year position as Guest Professor in Biophotonics at Lund Institute of Technology in Sweden during 2006-2011. In 2004 he received the prestigious Doctor of Science (dr. techn.) degree from the Technical University of Denmark for the dissertation entitled "The Generalised Phase Contrast method". Together with a colleague he has authored a 310 pages Springer book on this topic. Prior to his achievements in Denmark, he was a visiting scientist at Hamamatsu Photonics Central Research Laboratories and in the Physics Dept. at Osaka University in Japan. Since he obtained his PhD at the Niels Bohr Institute in 1994, he has published more than 250 journal articles and international conference papers and holds around 25 international patents and patent applications. He has published papers in Nature Materials, Nature Methods and Nature Photonics. He is the year 2000 recipient of the Danish Optical Society Award and was elected as «Scientist of the Year» in 2005 by Dir. Ib Henriksen's Foundation in Denmark. He is a 2010 elected Fellow of the OSA and a Fellow of the SPIE as the first from Denmark. In 2012-2014 he is appointed for the prestigious SPIE Fellows committee together with an American physics Nobel laureate. In 2013 he has been invited for the Editorial Board of JEOS. He is founder of the DTU start-out OptoRobotix originally spun out in the Silicon Valley region i.e. www.optorobotix.com.

Research
The sci-fi inspired shrinking of macro-scale robotics and handling down to the micro- and nano-scale regime opens new doors for exploiting the forces of light for micro- and nanobiologic probing, actuation and control. Advancing light-driven micro-robotics requires the optimization of optical forces and torques that, in turn, requires clever engineering and optimization of the underlying light-matter interaction. The requirement of having highly focused beams in optical trapping systems exemplifies the need for optimal light-shaping in optical handling, manipulation and sorting. On the other hand, the recent Nature report on stable optical lift shows that optical manipulation can be achieved, even when using unshaped light, by using an appropriately shaped structure instead. Therefore, a generic approach for optimizing light-matter interaction would involve the combination of optimal light-sculpting techniques with the use of optimized shapes in micro-robotics structures. Micro-fabrication based on two-photon polymerization offers three- dimensional resolutions for creating custom-designed monolithic structures that can be equipped with optical trapping handles for convenient opto-mechanical control using only forces of light. These microstructures can be effectively handled with simultaneous top- and side-view on our proprietary Biophotonics Workstation to carry out six-degree-of-freedom optical actuation of these polymerised structures with features entering the submicron-regime. Moreover, we have exploited the light shaping capabilities available on the workstation to demonstrate a new strategy for controlling microstructures that goes beyond the typical refractive light deflections that are utilized in conventional optical trapping and manipulation. We have taken this approach to extend the opto-mechanical light-force driven capabilities by including functionalised mechanisms to the fabricated structures. Most recently, we pioneered the idea of free-floating waveguides coined: Wave-guided Optical Waveguides (WOWs) - to be real-time optically handled, controlled and tracked using our Biophotonics Workstation. We also proposed designing photo-polymerised micro-structures for so-called structure-mediated access to the nanoscale and real-time sculpted light for the rapidly emerging areas of neurophotonics and two-photon optogenetics.

Best regards,
Lars-Ulrik Aaen Andersen, Director

DTU Fotonik
Department of Photonics Engineering

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