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Glückstad, Jesper

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The BioPhotonics Workstation: from university research to commercial prototype

Jesper Glückstad, DTU Fotonik, Dept. of Photonics Engineering, Technical University of Denmark

Abstract

I will outline the specifications of the compact BioPhotonics Workstation we recently have developed that utilizes high-speed spatial light modulation to generate an array of reconfigurable laser-traps making 3D real-time optical manipulation of advanced structures possible with the use of joysticks or gaming devices. The fabrication of microstructures with sub-micron features coupled with the real-time user-interactive optical control allows a user to robotically actuate appended structures depending on their intended function. These micro-platforms carrying sub-micron tools are seen to have potential uses in a variety of micro-biological experiments. Optically actuated needles may be functionalized or directly used to probe targeted cells at specific locations or assist the separation of dividing cells, among other functions that can be very useful for the group of microbiologists.



Jesper Glückstad established the Programmable Phase Optics www.ppo.dk activity in Denmark ten years ago and currently holds a position as Professor at DTU Fotonik, Dept. of Photonics Engineering at the Technical Univ. of Denmark, and a position as Guest Professor in Biophotonics at Lund Institute of Technology, Sweden. In 2004 he received the prestigious Doctor of Science (DSc) degree from the Technical University of Denmark for the dissertation entitled “The Generalised Phase Contrast method”. Together with a colleague he has authored a Springer book on this topic published in the fall 2009. Prior to his achievements in Denmark, Prof. Glückstad 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 20 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 the Ib Henriksens Foundation in Denmark. Prof. Glückstad is a 2010 elected Fellow of the OSA and a Fellow of the SPIE as the only from Denmark.