

SEMINAR

Centre for Optical and Laser Engineering (COLE)
School of Mechanical & Aerospace Engineering,
Nanyang Technological University

In conjunction with
OPSS (Optics and Photonics Society of Singapore)
SPIE (Student Singapore Chapter)

Title: Advanced active diffractive optical elements

Speaker: Dr. Sergiy Valyukh

Affiliation: Docent at Laboratory of Applied Optics, Linköping University (Sweden)

Date : 17th Dec, 2012

Time : 10 :00 am

Place : Meeting Room D (Block N3.2-02-59)

ABSTRACT OF TALK

Numerous modern optical instruments require compact elements with variable parameters, e.g. lenses with variable focal distance, dynamic diffraction gratings, tunable prisms, etc. Essential research efforts are focused on liquid crystal diffractive optical elements. There are two main reasons for this: 1) diffractive optical elements can be sufficiently compact and effective; and 2) liquid crystals, which easily can be integrated into any optical system, endow optical elements with non-mechanical tunability and low power consumption.

In the present report, physical limitations and potential abilities of liquid crystal diffractive optical elements will be discussed. Special attention will be paid to achievement of the needed configuration of nematic liquid crystal by means of inhomogeneous alignment – non-uniform anchoring and pretilt angle distribution. As examples of practical applications, a reflective lens utilising cholesteric liquid crystal and a projection optical system for an augmented reality display built into a contact lens or glasses will be reported.

As an additional topic, techniques of variable angle spectroscopic ellipsometry for non-destructive characterizations of surfaces and materials will be considered. Results of the research activity of the Laboratory of Applied Optics (IFM) at Linköping University, which is well known in the global ellipsometric community, will be reported.

BIOGRAPHY of SPEAKER

Sergiy Valyukh graduated from Physical Faculty of Kiev National University (Ukraine) in 1994 and then worked for development of computer controlled devices at Scientific Production Association “Electronmash” and at Institute of Semiconductor Physics of Academy of Science of Ukraine. The area of his research relates to experimental and theoretical study of light interaction with non-uniform complex-structured media. He was one of the principal developers of automated diagnostic systems for characterization of flat panel displays. Such systems were sold to companies from Ukraine, India, Hong Kong, China and Sweden. He defended his Ph.D. thesis in speciality “Optics and Laser Physics” at Kiev National University, 2003.

Dr. Valyukh conducted research as a Post. Doc. at Swedish LCD Center and Dalarna University (Sweden), 2003-2006. Simulation and characterization of liquid crystal devices were in his focus. In 2005 and 2007, he was a visiting researcher at Hong Kong University of Science and Technology. Dr. Valyukh has founded a company specializing on development of optical measuring equipment and simulation Software. In 2009, he was nominated for the Year Award in Dalarna, Sweden as a successful beginner entrepreneur. Since 2010, he works as an assistant professor and then as a docent at Linköping University.

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