

JUNE VICTORIAN BRANCH MEETING

Plasmonic diffractive optics

Prof. Byoung-ho Lee

OSA Fellow, SPIE Fellow

School of Electrical Engineering, Seoul National University

6.00pm Wednesday 24 June, 2009

(Refreshments provided from 6:00 pm prior to the talk)

Hercus Theatre, David Caro (Physics) Building

University of Melbourne

The surface plasmon polariton (SPP) subwavelength optics is one of most remarkable research areas in the field of optical science, since SPP shows many unique characteristics that cannot be obtained with conventional classical diffractive optics. Control and management of SPP have been intensively investigated as a fundamental issue. Among several methods related to SPP control, diffraction of SPP can provide unique ways of controlling SPP. For convenience, we can classify the diffraction of SPP into three kinds, i) diffraction or coupling of external optical field to SPP, ii) diffraction of SPP to external optical field, and iii) diffraction of SPP to SPP. The third is called low-dimensional diffraction of SPP.

In this talk, I will present three classified SPP diffraction processes and discuss related issues and their applications:

- First, regarding the diffraction of external optical field to SPP, interesting SPP excitation schemes under study are addressed. Controllable SPP hot-spot generation, SPP excitation and focusing through metallic half-circle slits are presented.
- Second, regarding the diffraction of SPP to external optical field, some results on SPP-assisted optical beaming is addressed. 2D optical beaming from subwavelength metallic slit and 3D optical beaming from subwavelength metallic hole are analyzed and related issues are accounted for.
- Third, regarding the diffraction of SPP to SPP, analysis method of low-dimensional diffraction of SPP and SPP modulation are presented. When SPP bound on metal surface meets dielectric or metal scatters, SPP is diffracted to both radiation mode and still surface-bound SPP. The consideration is focused on the SPP-to-SPP diffraction process. Based on analysis, I will show feasible SPP modulation schemes for SPP-based information processing. In my talk I will also explain plasmonic tunneling structure design.

Members are encouraged to join the speaker and members of the Branch Committee for dinner following the talk at a local restaurant. In order to assist with table reservations please contact the Honorary Secretary (email below) by Friday June 19.

Honorary Secretary

Dr. Scott Wade

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Introduction of the speaker

Byoung-ho Lee received B. S. and M. S. degrees in 1987 and 1989, respectively, from Seoul National University, Seoul, Korea in Electronics Engineering. He received a Ph. D. degree in 1993 from the University of California at Berkeley in Electrical Engineering and Computer Sciences. In 1994 he joined the faculty of the School of Electrical Engineering, Seoul National University, where he became a full professor in 2005.

He became a Fellow of SPIE (The International Society for Optical Engineering) in 2002 and a Fellow of OSA (The Optical Society of America) in 2005. During 2006-2008 he served as a Director-at-Large (Board of Directors) of OSA and a member of the Award Committee of Board of Directors of OSA. During 2009-2011 he is a member in the Strategic Planning Committee of OSA. In 2009 he is also in the John T. Tate Medal Committee of the American Institute of Physics. He also served as a member of the Engineering, Science and Technology Policy Committee of SPIE.

Currently, he is a topical editor of Applied Optics, an associate editor of the Journal of the Society for Information Display and the editor-in-chief of the Journal of the Optical Society of Korea. He has served in the editorial board of the Japanese Journal of Applied Physics and Optical Fiber Technology. He was the conference Co-Chair of the 'Holography, Diffractive Optics, and Applications II' (part of Photonics Asia) held in Beijing, China, in November 2004. He has also been a chair or co-chair of the OSA Topical Meeting on Digital Holography and Three-Dimensional Imaging during 2007-2009. His laboratory was honored as one of the first National Research Laboratories by the Ministry of Science and Technology of Korea. In 2002 he received the 5th Young Scientist Award from the President of Korea. In 2007 his laboratory was selected as the Ministry of Science and Technology of Korea as a National Creative Research Initiative Center. Current research topics of his laboratory are plasmonic diffractive optics, nanophotonic device modeling and fabrication and three-dimensional display. His research group has published more than 240 international journal papers and presented more than 380 international conference papers including about 60 invited papers.