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## Optical design and analysis of inorganic and organic nano/microscale structures for light harvesting and sensing applications

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Over the past few years, light managements including anti-reflection, light scattering, and light trapping have been shown to be a promising approach to develop various optoelectronic and photonic devices and to improve their performance for optical sensing and energy harvesting applications. As an alternative of conventional anti-reflection layers, there has been much research on the nano- or micro-textured surfaces with efficient anti-reflection and light-scattering properties. Low-dimensional metal oxide nanostructures are very promising for photodetectors and sensors because of their excellent physical and chemical properties. On the other hand, to enhance light harvesting, anti-reflective structured polymers, for example, polycarbonate, polydimethylsiloxane, polymethyl methacrylate, polyurethane, etc., have been explored. Also, these structures can be employed in light-emitting diodes to enhance the light extraction efficiency. For this reason, an increasing attention has been recently given to functional nano/microstructures, various fabrication methods using growth/synthesis as well as dry/wet etching via nano/micro patterning were developed. Therefore, optical design and analysis of nano/microscale structures are required for potential applications of various devices such as solar cells, photodetectors, light-emitting diodes, and sensors. In this talk, I present the fabrication and optical properties of inorganic and organic nano/microstructures were designed and analyzed based on theoretical calculations. By applying these structures to optoelectronic and photonic devices, their characteristics were evaluated.

## Biography

Jae Su Yu received the PhD degree in Optoelectronic Engineering from Gwangju Institute of Science and Technology, Republic of Korea, in 2002. He joined the Center for Quantum Devices, Northwestern University, Evanston, IL, as a Post-doctoral Fellow in Oct. 2002, where he worked on the fabrication, packaging, and characterization of quantum cascade lasers. Since joining in Sept. 2006, he is a Tenured Professor in the Department of Electronic and Radio Engineering, Director of the Institute for Laser Engineering, and Kyung Hee Fellow, Kyung Hee University, Republic of Korea. He has authored or co-authored more than 240 journal papers. His research interests include solar cells, light-emitting diodes, optical sensors, miro/nanostructures, nanophotonics, phosphors, etc.

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