

Advanced Photonic Science & Technology Seminar

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Nanophotonics beyond the diffraction-limited resolution barrier

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Direct laser writing by a high numerical-aperture objective has become a powerful tool toward the development of ultimate three-dimensional (3D) photonic devices. However, this method exhibits a fundamental physical limit determined by Abbe's law discovered by a German physicist, Ernst Abbe, in 1873. Abbe's barrier means that the size of the fabricated features is approximately half of the wavelength used for direct laser writing. Because of the increasing demand for realising nano-geometries, the diffraction-limited resolution barrier associated with this method should be overcome. We have shown that this diffraction limit barrier can be broken in the development of two-beam nanolithography, called superresolution photoinduction-inhibited nanolithography (SPIN). Consequently, we have realised the nanowires of 9 nm in diameter. With the help of SPIN, it is possible to develop Petabyte optical disks, forming a green-technology platform for future data centres, or to develop biomimetic photonics inspired by butterfly wing-scales, showing the 3D photonic feature exceeding its natural original.



Biography: Professor Gu is a Laureate Fellow of the Australian Research Council, Director of the Centre for Micro-Photonics and University Distinguished Professor at Swinburne University of Technology. He is a sole author of two standard reference books and has over 400 publications in nano/biophotonics. He is an elected Fellow of the Australian Academy of Science as well as the Australian Academy of Technological Sciences and Engineering. He is also an elected fellow of the AIP, the OSA, the SPIE, the InstP, and the IEEE. He was President of the International Society of Optics within Life Sciences, Vice President of the Bureau of the International Commission for Optics (ICO) (Chair of the ICO Prize Committee) and a Director of the Board of the Optical Society of America (Chair of the International Council). He was awarded the Einstein Professorship (Chinese Academy of Science, 2010) is a recipient of the W. H. (Beattie) Steel Medal of the Australian Optical Society (2011), the Ian Wark Medal and Lecture of the Australian Academy of Science (2014) and the Boas Medal of the AIP (2015).

For additional information please contact joint hosts: Professors Peter So and Nicolas Fang.