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MQ Photonics Research Centre Seminar

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(Zoom link: <https://macquarie.zoom.us/j/85829287435>)

2D materials and their functional photonics devices

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Abstract:

2D materials are a promising solution for next-generation optoelectronic devices due to their unique properties. We investigated the third-order nonlinearity of black phosphorus and firstly observed the polarization-dependent nonlinear absorption coefficient and nonlinear refractive index, which can be used to design photonics devices. Then, we designed and fabricated a 2D perovskite flat lens through mask-free femtosecond direct laser writing techniques. The as-fabricated lenses exploit the tunable material property variations to effectively manipulate not only the amplitude but also the phase of the incident light to focus into a 3D focal spot with a sub-wavelength resolution in the range of $0.5\text{-}0.9\lambda$. In the last, I will discuss a 2D/3D graphene Janus absorber generated through single shot flashlight, which can be used for highly efficient interfacial solar steam generation and water desalination.

Speaker biography:

Dr Tieshan Yang obtained his PhD in 2020 from Swinburne University of Technology. Currently, he is a Postdoctoral Research Associate at University of Technology Sydney (UTS) and the ARC Centre of Excellence for Transformative Meta-Optical Systems (TMOS) UTS Node. His research interests focus on 2D materials, nonlinear optics, nanofabrication, single photon emitters and functional photonics devices. He has published more than 30 papers and conference proceedings, including the ones on highly ranked journals such as Adv. Mater., J. Mater. Chem. A, Chem. Mater., ACS Photonics, Nat. Commun. and J. Am. Chem. Soc. He has also been awarded several prestigious prizes. Dr Yang has been actively involved in professional services and leaderships, serving as the President of Swinburne Optics and Photonics Chapter funded by OSA and SPIE. He has been serving as the Editorial Board Member of American Journal of Optics and Photonics since October 2020. Also, he served as a regular reviewer for Nat. Commun.

