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Light-matter interactions in 2D Materials

Two-dimensional (2D) materials, such as graphene and monolayer transitional-metal-dichalcogenides (TMDs), have aroused great attention due to the underlying fundamental physics and the promising atomically-thin optoelectronic applications. Optical properties of these 2D materials are fundamentally interesting such as magneto-phonon resonance in graphene and strong excitonic emission in monolayer WS2. Meanwhile, development of practical optoelectronics based on 2D materials is very promising, which opens many opportunities for the next-generation light-emitting applications such as valley light-emitting diodes and on-chip vertical-cavity surface-emitting lasers (VCSELs). Here, we report observations of magneto-phonon coupling effects in graphene layers, wealthy excitonic emission states of monolayer WS2, and 2D semiconductor lasing from monolayer WS2 embedded VCSELs. Overall, our studies provide many new understandings on fundamental light-matter interactions in atomically thin materials and pave ways to develop industrially attractive light-emitting applications based on 2D semiconductors.

Speaker Biography

Ting Yu received his PhD in Department of Physics, National University of Singapore in 2003 and currently is a Professor in Division of Physics and Applied Physics, Nanyang Technological University, Singapore. His research interests cover fabrication of low dimensional, especially 2D materials and investigation of their optical, optoelectrical and electrochemical properties for developing novel electronics, optoelectronics and energy conversion/storage devices. Yu has published more than 260 SCI papers and received over 18,500 non-self-citations. His H-index is 75.

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