seminars

Wednesday 22nd February 12:00h

c/Faraday, 9
Conference Hall
Imdea Nanociencia
Ciudad Universitaria de Cantoblanco

2D materials polaritons

Prof. Tony Low
Electrical & Computer Engineering,
University of Minnesota, Minneapolis, USA

In recent years, enhanced light-matter interactions through a plethora of dipole-type polaritonic excitations have been observed in two-dimensional (2D) layered materials. In graphene, electrically tunable and highly confined plasmon-polaritons were predicted and observed, opening up opportunities for optoelectronics, bio-sensing and other mid-infrared applications. In hexagonal boron nitride, low-loss infrared-active phonon-polaritons exhibit hyperbolic behavior for some frequencies, allowing for ray-like propagation exhibiting high quality factors and hyperlensing effects. In transition metal dichalcogenides, reduced screening in the 2D limit leads to optically prominent excitons with large binding energy, with these polaritonic modes having been recently observed with scanning near field optical microscopy. Here, we review recent progress in state-of-the-art experiments, survey the vast library of polaritonic modes in 2D materials, their optical spectral properties, figures-of-merit and application space. Taken together, the emerging field of 2D material polaritonics and their hybrids provide enticing avenues for manipulating light-matter interactions across the visible, infrared to terahertz spectral ranges, with new optical control beyond what can be achieved using traditional bulk materials.

[1] Low T, Chaves A, Caldwell JD, Kumar A, Fang NX, Avouris P, Heinz TF, Guinea F, Martin-Moreno L, Koppens F. Polaritons in layered two-dimensional materials. Nature Materials. 2016 Nov 28.

Short Bio: Tony Low leads the theory and computational nanoscience group in the department of Electrical & Computer Engineering at the University of Minnesota. Low obtained his doctoral degree from the National University of Singapore in 2008. Prior to joining University of Minnesota, Low worked as an in-house theorist at various experimental groups at Columbia University, Yale University and IBM Thomas J. Watson Research. While at IBM, from 2011-2014, Low served as an industry liaison to various Universities under the Nanoelectronics Research Initiative with the goal of finding the next electronics switch. Low received the several awards from IBM and was recipient of various fellowships.

Nanoscience and Nanotechnology: small is different
Nanociencia y Nanotecnología: lo pequeño es diferente

instituto imdea nanociencia

UNIÓN EUROPEA
FONDOS ESTRUCTURALES

GOBIERNO DE ESPAÑA
MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

Comunidad de Madrid