IBS CINAP Seminar

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Hexagonal Boron Nitride Photonics

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Abstract

Single photon emitters (SPEs) are key resources for many quantum technologies including quantum computation and quantum communications. To date, the most investigated solid state SPE systems are epitaxial quantum dots that operate primarily at cryogenic temperatures, and colour centres in solids. Despite years of research, the existing systems remain inadequate for practical applications, and the search is on for high-performance quantum emitters. In 2015, the SPE platform expanded to two-dimensional (2D) materials. In 2016, hexagonal boron nitride (hBN) emerged as a compelling 2D host of SPEs.

SPEs in hBN are promising because they are bright, with more than a million counts per second at room temperature, optically stable at ambient conditions, fully polarized and with a narrow zero photon line (ZPL). Furthermore, hBN is a wide bandgap material, which guarantees optical transparency in the visible and IR spectral regions. These factors make this material an outstanding candidate for quantum nanophotonics with diverse promising applications.

In this talk, I will discuss fundamental characteristics of SPEs in hBN including temperature and strain dependency. On the device fabrication front, I will discuss coupling emitters to the Plasmonic and dielectric resonators. Finally, I will discuss promising applications of hBN photonic devices.

Biography

Dr Sejeong Kim received her PhD in August 2014 from Korea Advanced Institute of Science and Technology (KAIST) where she developed experimental techniques to engineer semiconductor micro/nano devices for various photonics applications. She is now a Chancellor’s Postdoctoral Research Fellow at the University of Technology Sydney (UTS) leading several research topics in hexagonal Boron Nitride (hBN) photonics. Dr Kim received the Best Emerging Scientist Award in Photonics and Quantum Electronics (2017) from Korean Physical Society for her contribution in the field. Her current research interest is developing photonic devices using hBN for quantum integrated photonics, optomechanics and nonlinear optics.

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