



MATERIALS SCIENCE and ENGINEERING SEMINAR

Co-Sponsored by the Center for Hybrid, Active,
and Responsive Materials



Dr. Min Seok Jang

School of Electrical Engineering

**Korea Advanced Institute of Science and
Technology (KAIST)**

Mid-Infrared Polaritonics in Two-Dimensional Materials

Polaritons – hybrid light–matter waves emerging from the coupling of light to collective oscillations of charges – promise to enable deeply subdiffractional light manipulation. In particular, polaritons in low-dimensional van der Waals crystals boast extremely high field confinement, enabling unprecedentedly strong light-matter interactions. Moreover, the dynamic tunability of graphene plasmons facilitates the creation of a new set of active nanophotonic devices that operate at high-speed. In the first part of this talk, I will discuss active metasurfaces based on graphene that operate at mid-IR frequencies, including the independent modulation of phase and amplitude of light, and dynamic angle steering of thermal emission. In the second part, I will introduce some of our near-field studies on mid-IR polaritons to manipulate their dispersion and reduce their damping. First, I will highlight the effects of the monocrystalline gold substrate on the polaritonic dispersion. Second, I will introduce bismuth and antimony chalcogenides as a new family of ultra-high-index and low-loss van der Waals dielectrics for polaritonic applications in mid-IR. Lastly, I will discuss dispersion engineering of van der Waals polaritons using a harmonically corrugated gold substrate - polaritonic Fourier crystals.

BIOGRAPHY

Min Seok Jang is an Associate Professor of Electrical Engineering at Korea Advanced Institute of Science and Technology (KAIST, faculty since 2016). He received his B.S. in Physics with highest honors from KAIST and Ph.D. in Applied Physics from California Institute of Technology (Caltech). He is an elected member of the Young Korean Academy of Science and Technology and received the Technology Innovation Award from the College of Engineering, KAIST.

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