

## SPIE Student Seminar Series



**Dr. Yuzhe Xiao**  
(University of Wisconsin-Madison)

### Non-trivial thermal emission: engineering to applications

**Tuesday, September 22, 2020**

**11:00 am ~ 12:00 pm (CDT)**

**ZOOM ID: 914 9485 2209**

**Abstract:** Every hot object emits electromagnetic radiation, which is called thermal emission or thermal radiation. Thermal emission is a ubiquitous phenomenon, with examples including the light emitting from the sun or from an incandescent lightbulb. Even though thermal emission has been well-known from the century-old Planck's law, recent applications of thermal emission in energy harvesting, radiative cooling and sensing have led to a renewed research interests of this topic.

This talk aims to focus on three aspects of thermal emission. First, I will talk about the surprisingly nontrivial measurement of thermal emission, especially how to address the impact of non-negligible background emission. I will show how to accurately calibrate measurements of low-temperature thermal emitters and emitters with temperature-dependent emissivity. Based on this calibrated-measurement capability, then I will introduce a new metrology method that can measure the temperature distribution of an object as a function of depth. The next part of my talk will cover the manipulation of thermal emission, where I will show nano-second modulation of thermal emission via modulated emissivity, with a speed much faster than the thermal time constant of the emitter. This talk will conclude with a discussion of future research opportunities of thermal-emission engineering with strong nonlinear light-matter interaction.

**Bio:** Dr. Yuzhe Xiao is a research associate in the group of Prof. Mikhail Kats at the University of Wisconsin-Madison. He received his Ph.D. degree from the Institute of Optics at the University of Rochester, under the supervision of Prof. Govind Agrawal, and was then a postdoc in the group of Prof. Zhaowei Liu at the University of California-San Diego. He has authored more than 30 publications in the fields of thermal emission, nonlinear optics, and quantum plasmonics. Dr. Xiao is the recipient of the Agnes M. and George Messersmith Fellowship (2013, University of Rochester), the People's Choice Presentation Award at the university-wide Postdoctoral Research Symposium (2018, UW-Madison) and the Best Student Presentation Award (second place) at the Integrated Photonics Research Conference (2012, OSA).

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