

SEMINAR NOTICE

Preston M. Green Department of Electrical and Systems Engineering

ON-CHIP WHISPERING GALLERY MODE MICRORESONATOR FOR SENSING APPLICATIONS

PhD Preliminary Research Examination

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Abstract: Whispering gallery mode (WGM) microresonators have been studied in many areas such as sensing, lasing, and fundamental study due to their high-quality factor and small mode volume. WGM microresonators are always coupled by a tapered fiber, and the coupling is controlled by a 3D nanotranslation stage. We always suffer from the instability of coupling condition, which means it is difficult to put microresonators in practical applications. In this talk, I will present a few methods to utilize WGM microresonators for nonlinear and sensing applications.

At first, I will talk about Raman lasing and the optical analog of electromagnetically-induced-transparency (EIT) in a packaged whispering-gallery-mode (WGM) microtoroid resonator. Secondly, I will introduce several sensing applications such as gas sensing, magnetic field sensing and acoustic sensing based on WGM microresonators. In gas sensing, we have proved the microresonators is one of the optimal gas sensors due to their sensitivity, selectivity and stability. In magnetic field sensing, we demonstrated a compact and robust magnetometer with a high sensitivity of 880 pT/Hz^{1/2} and a 4-decade dynamic range. Moreover, we have also successfully applied microresonators in acoustic sensing and imaging. Our device has achieved much higher sensitivity than the reported commercial acoustic micro sensors. These results open the way for portable, robust, and stable WGM microlasers and sensors for applications in various environments.

DATE: Tuesday, January 23, 2018
TIME: 3:00 p.m.
PLACE: Green Hall, Room 0120

Thesis advisor:
Dr. Lan Yang

This seminar is in partial fulfillment
of the Doctor of Philosophy degree