



Lithium Niobate MEMS Resonators for RF, Photonics and Opto-mechanics

Professor Sunil Bhave
Purdue University

Date: Friday, September 9, 2016

Time: 2:00pm

Location: EEB 132

Refreshments will be served

Abstract: Commercial markets desire integrated multi-frequency “band”-select duplexer and diplexer filters, with fractional bandwidth (BW) ranging from 3% to 10% and steep roll-off for high stop band rejection. The achievable bandwidth of such filters is ultimately limited by the electro-mechanical coupling factor (k_t^2) of the resonators, while the roll-off is determined by resonator quality factor (Q). Therefore, resonators with both high k_t^2 and high Q are desired for large BW steep roll-off filters.

In this talk I present the fabrication technology, design and characterization of thin-film lithium niobate (LN) contour-mode resonators. By carefully positioning the inter-digital transducer (IDT), we achieved CMRs with $k_t^2 \times Q$ of 148 (IDT @ node) and very high k_t^2 resonators with spur-attenuated response (IDT @ anti-node). We have demonstrated resonators with frequencies ranging from 400MHz to 1.9GHz on a single chip. I will conclude my talk by providing a glimpse of how we are leveraging our mastery of micromachining and MEMS to fabricate high optical Q photonic resonators on the same platform paving the way multi-GHz acousto-optic modulators (AOM) and wide-bandwidth, frequency-agile microwave photonic filters.

Biography: Sunil received the B.S. and Ph.D. degrees from Berkeley in EECS in 1998 and 2004 respectively. In April 2015, he joined the department of Electrical and Computer Engineering at Purdue University as an Associate Professor. Sunil received the NSF CAREER Award in 2007, the DARPA Young Faculty Award in 2008 and the IEEE Ultrasonics Society’s Young Investigator Award in 2014. His students have received Best Paper Awards at IEEE Photonics 2012, Ultrasonics 2009 and IEDM 2007. Sunil is a co-founder of Silicon Clocks, which was acquired by Silicon Labs in April 2010. Before joining Purdue, Sunil was an associate professor at Cornell for 10 years.

Hosted by Prof. Hossein Hashemi, Prof. Mike Chen, and Prof. Mahta Moghaddam. Organized and hosted by Tzu-Fan Wu.