Lithium Niobate Based Photonic Integrated Circuits for Reconfigurable Sensing and Signal Processing

PI: Songbin Gong, Assistant Professor
Electrical and Computer Engineering
University of Illinois at Urbana-Champaign

Email: Songbin@Illinois.edu
Web: ilirm.ece.Illinois.edu

Research Objectives

• Develop photonic integrated circuits (PIC) for widely tunable and highly sensitive microwave and millimeter-wave radiometry
• Innovations in material synthesis, device design, and platform integration

Approach

• Resort to the recent advances in integrated photonic devices to process microwave signals

• Use ion-sliced lithium niobate (LiNbO$_3$ or LN) thin films of single crystal quality for their strong electro-optic, piezoelectric properties, and strong acousto-optic interactions

Potential Impact

• Applications in Earth and Planetary Science and limb sounders and auroral imagers

• Subsystems applicable for optical frequency data acquisition in NASA science missions

• Improve SOA in bandwidth, tuning range, and NEP
• TRL 2 at the start and TRL 4 at the conclusion

Enabling Subsystems in the LN PIC platform exploiting interactions among microwave, photons, and phonons