CIRMM/LIMMS

NOMURA LAB.

[Energy Harvesting by Nanotechnology]

Centre for Interdisciplinary Research on Micro-Nano Methods

Integrated Quantum Electronics, Phonon Engineering

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Thermal Conduction Nanoengineering and Thermoelectric Energy Harvesting

Coherent control of heat transfer in semiconductor nanostructures by phonon engineering

Thermal conduction can be controlled by nanoengineering. Our goal is to use nanofabrication technology to develop highly efficient silicon thermoelectric devices for energy harvesting and thermoelectric applications.

- Nanoscale heat transport; Physics, Control, and Thermoelectric devices
- Thermal Phononics ~Si phononic crystals~
- Large-area Si energy harvester using nanostructures
- Physics in optomechanical systems with photonic crystal nanocavity

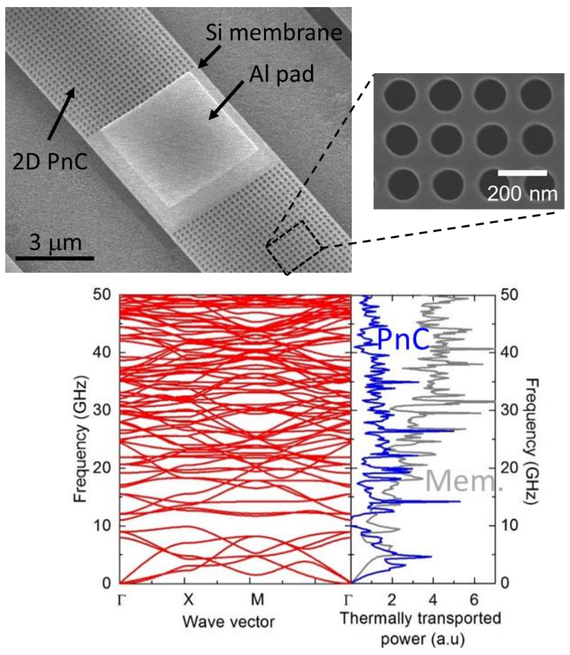


Fig. 1. SEM images of fabricated phononic crystal nanostructures. Calculated band diagram and heat flux spectrum.

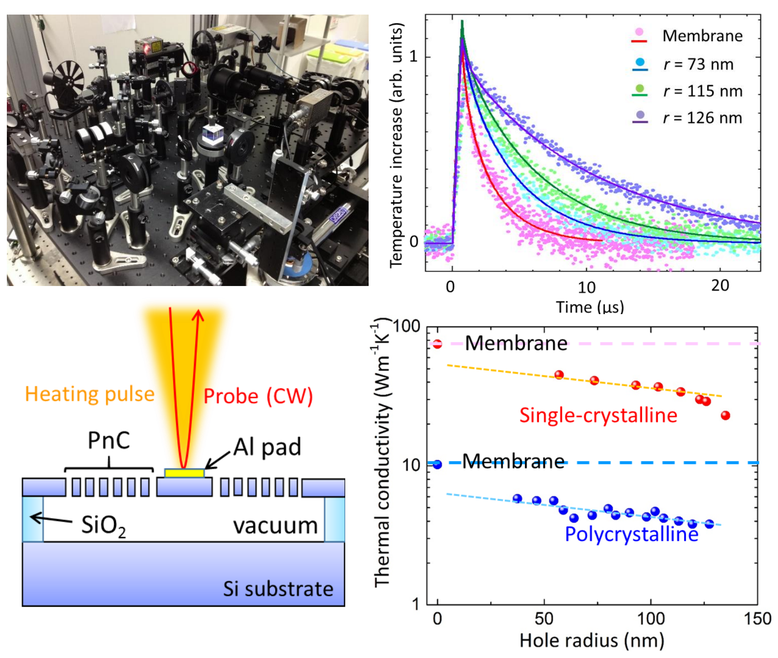
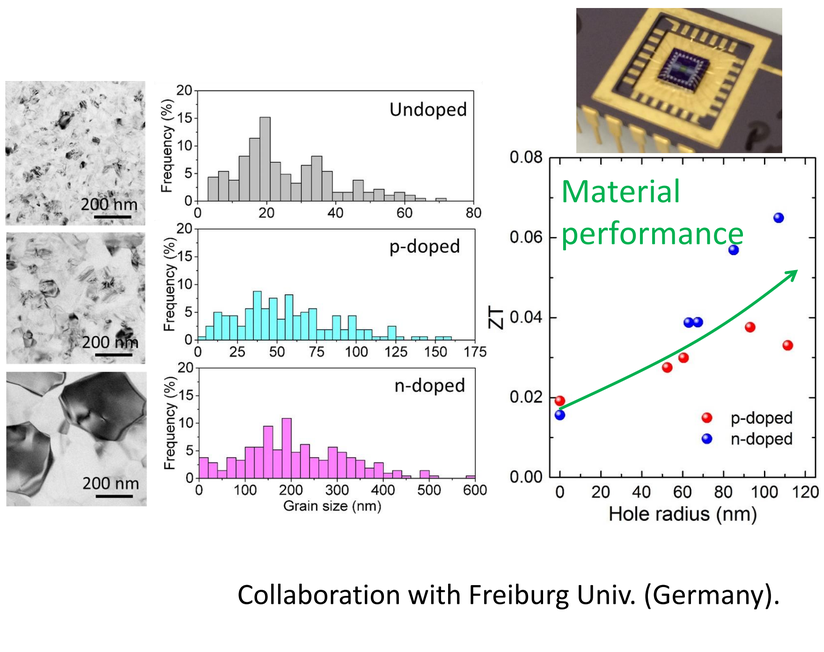


Fig. 2. μTDTR system and thermal conductivity of PnC nanostructures.



Collaboration with Freiburg Univ. (Germany).

Fig. 3. Development of polycrystalline Si PnC thermoelectric materials.

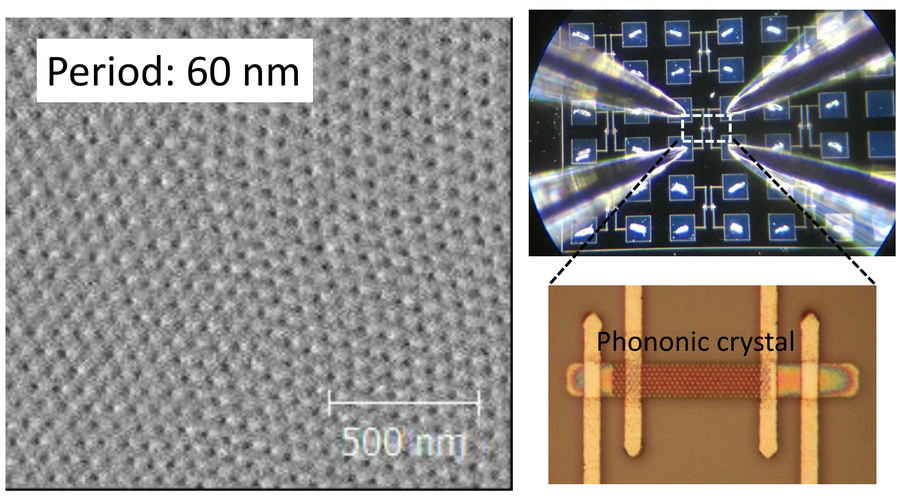


Fig. 4. Energy harvesters using large-area Si thermoelectric nanomaterials and application to smart community.

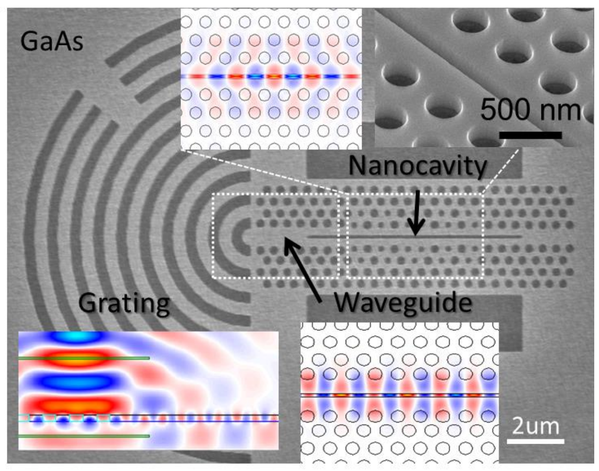


Fig. 5. Investigated GaAs optomechanical system with an air-slot PhC nanocavity.

Partially collaborate with Hirakawa Lab., Yoshie Lab., and Arakawa-Iwamoto Labs.