

Joint Workshop of Tohoku University and National Yang Ming Chiao Tung University

Date/Venue: 14:40-17:45, 5.23, 2025/Seminar Room, 3rd floor, COE Building, Institute of Fluid Science, Tohoku University

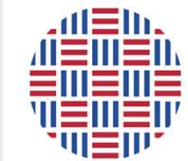
JSPS Grants-in-Aid for Scientific Research S (20H05649)

無欠陥ナノ周期構造によるフォノン場制御を用いた
高移動度半導体素子

High-mobility Semiconductor Devices due to
Control of Phonon Field caused
by Defect-free Nano-periodic Structures

Principal Investigator

Chair Prof. Dr. Seiji Samukawa (NYCU/Tohoku University)



臺日交流推動辦公室



Joint Workshop of Tohoku University and NYCU
Seminar Room, 3rd floor, COE Building, Institute of Fluid Science, Tohoku University
14:40-17:45, 2025

1. (基調講演, Keynote)

14:45: ナノ世界でのデバイスと生体分子の出会い。

Where Nanodevices Meet Biomolecules — Encounters in the Nanoworld

山下一郎 (大阪大学大学院工学研究科、WPI), Ichiro Yamashita (Osaka University)

2. (成果報告, Results report)

1). (総合報告, General Report)

15:30: Si NP/SiGe複合膜のフォノン場・電子制御技術に関する成果概要, 大堀大介 (東北大学)

Summary of achievements regarding phonon field and electronic control technology in Si NP/SiGe composite films, Daisuke Ohori (Tohoku University)

2). 16:00: シリコンナノピラー構造薄膜の電子輸送特性, 山本淳 (産業技術総合研究所)

Electronic transport properties of silicon nanopillar thin films, Jun Yamamoto (AIST)

3). 16:30: Siナノピラーをチャンネルとするトランジスタ試作プロセス開発, 太田裕之 (産総研)

Development of a prototype process for transistors with Si nanopillar channels, Hiroyuki Ohota (AIST)

4). 17:00: ナノピラーおよびナノ界面を有する薄膜のコヒーレント熱輸送, 野村政宏 (東京大学)

Coherent thermal transport in thin films with nanopillars and nanointerfaces, Masahiro Nomura (UT)

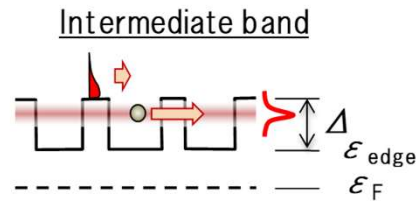
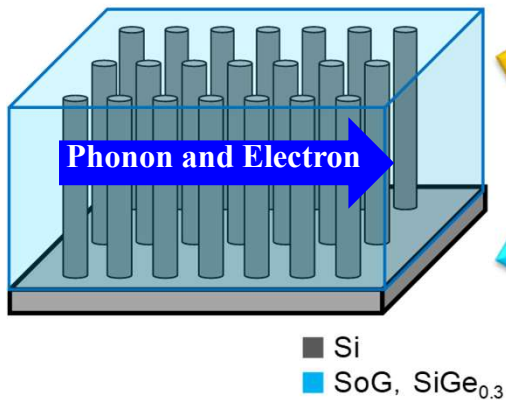
5). 17:30 基盤研究Sプロジェクト総括 寒川 誠二 (国立陽明交通大学/東北大学)

Conclusion of JSPS Grants-in-Aid for Scientific Research S (NYCU/Tohoku University)

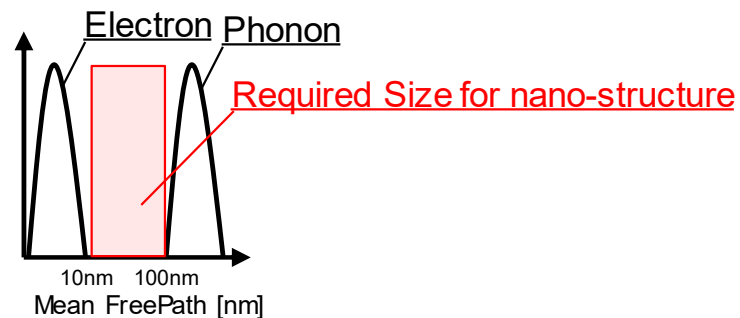
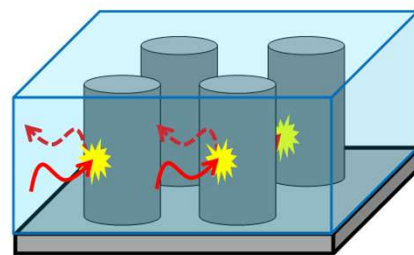
Precisely Ordered Nano-structure for Thermo-electric Devices

*Reducing the thermal conductivity
with keeping (enhancing) the electrical conductivity*

Our target structure



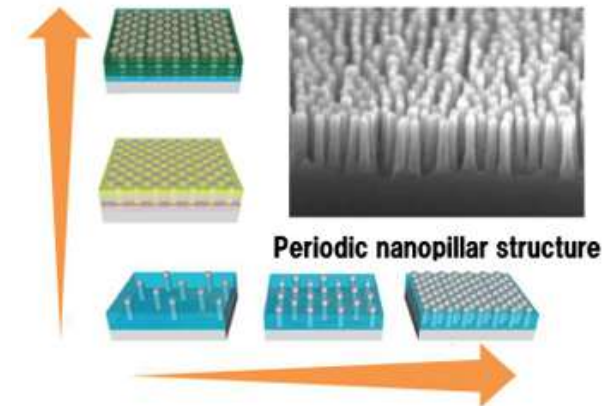
Phonon scattering
at the interface of SiNWs



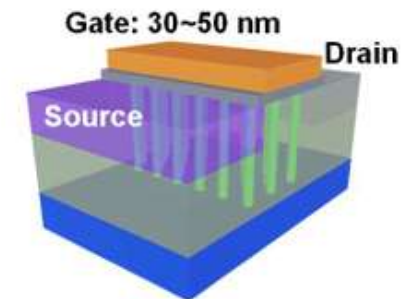
Improve
the power factor

$$ZT = \frac{\alpha^2 \sigma}{K} T$$

Reducing
the thermal conductivity



Independent control of Phonon/Electron band
by size controlled nanopillar structure



Novel planer type MOSFET