

Supplementary material to “Anomalous thermal conductivity enhancement in low dimensional resonant nanostructures due to imperfections”

Hongying Wang^{1,+}, Yajuan Cheng^{2,+}, Zheyong Fan^{3,*}, Yangyu Guo⁴, Zhongwei Zhang⁴, Marc Bescond⁶, Masahiro Nomura⁴, Tapio Ala-Nissila^{2,5}, Sebastian Volz⁶, and Shiyun Xiong^{1,4†}

1. Institute of Functional Nano and Soft Materials (FUNSOM),
Jiangsu Key Laboratory for Carbon-Based Functional Materials and Devices, Soochow
University, 199 Ren'ai Road,
Suzhou, 215123, Jiangsu, P. R. China.

2. Key Laboratory of Organic Synthesis of Jiangsu Province and the State and
Local Joint Engineering Laboratory for Novel Functional Polymeric Materials,
College of Chemistry,
Chemical Engineering and Materials Science,
Soochow University, Suzhou 215123, P. R. China.

3. MSP group, QTF Centre of Excellence,
Department of Applied Physics,
Aalto University, FI-00076 Aalto, Finland

4. Institute of Industrial Science,
The University of Tokyo, Tokyo 153-8505, Japan.

5. Interdisciplinary Centre for Mathematical Modelling,
Department of Mathematical Sciences,
Loughborough University, Loughborough,
Leicestershire LE11 3TU, UK.

6. Laboratory for Integrated Micro Mechatronic Systems (LIMMS/CNRS-IIS),
The University of Tokyo, Tokyo 153-8505, Japan.

1. Phonon dispersions and group velocities

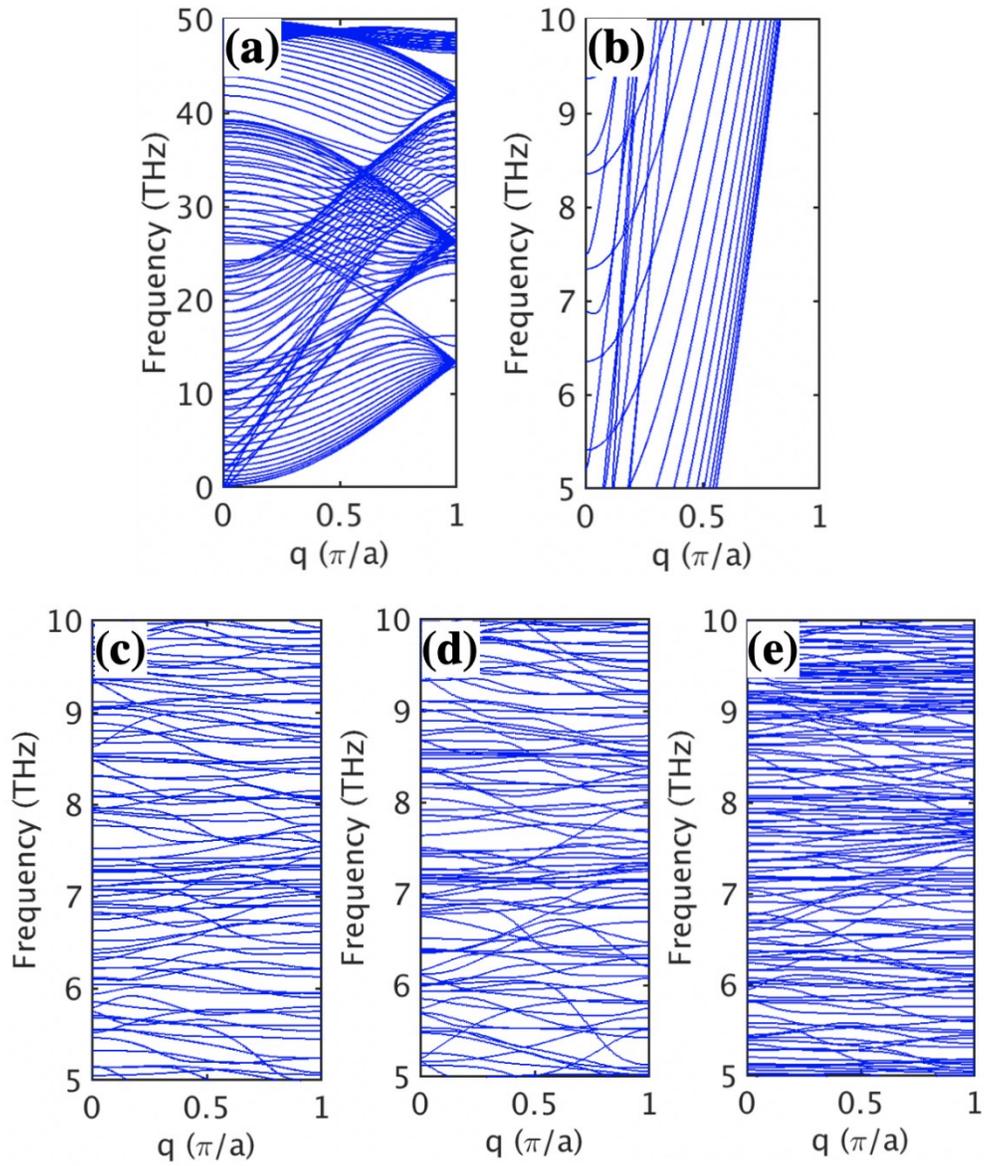


Figure S1. Phonon dispersion curves in different frequency ranges for (a) pristine GNR (0-50THz), (b) pristine GNR (5-10 THz), (c) PR-GNR (5-10 THz), (d) DR-GNR (5-10 THz), and (e) HR-GNR-2m (5-10 THz).

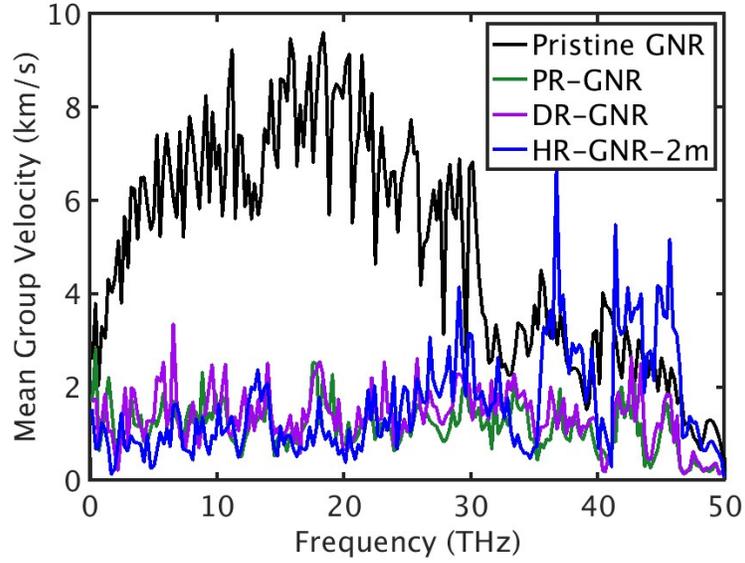


Figure S2. Comparison of phonon group velocities between Pristine GNR, PR-GNR, DR-GNR and HR-GNR-2m.

2. In-plane and out-of-plane decomposition of TC

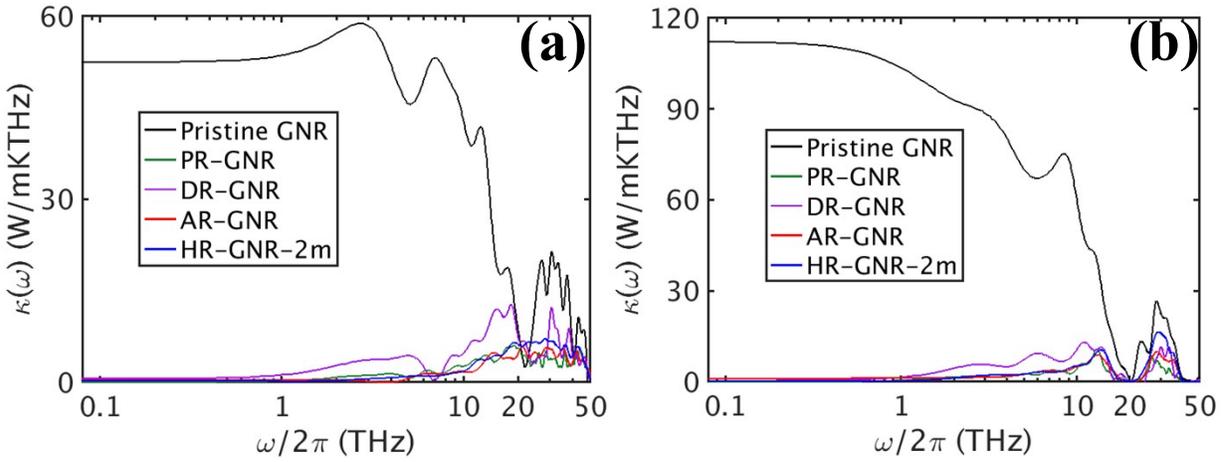


Figure S3. The in-plane (a) and out-of-plane (b) contributions of spectrally decomposed TC for different structures.