

学术讲座



同济大学
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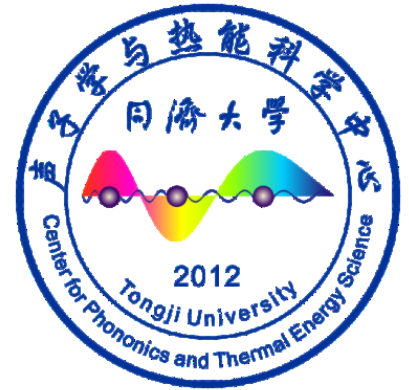
同济大学高端外国专家

日本东京大学

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时间: 10月31日(周四), 下午14:00-15:00

地点: 第一实验楼423室



Ballistic and Coherence in Thermal NanoPhonics

报告摘要:

The ballisticity of thermal phonons is a well-accepted mechanism but remains difficult to prove. We propose to experimentally investigate such a behavior in silicon short Nanowires [1] and Phononic Crystals [2] uncovering size and temperature ranges when ballisticity appears.

Original strategies to break ballisticity by using nanocoatings [3] or etching techniques (black silicon) [4] will then be presented when applied to silicon nanomembranes.

Finally, a new type of thermally resistive mechanism based on the combination of disorder and coherence will be demonstrated in 2-Dimensional heterostructures. A detailed analysis of the thermal phonon spectra will indeed prove the existence of localization due to interface diffusion [5].

[1] Anufriev, R., Gluchko, S., Volz, S., & NOMURA, M., "Probing ballistic thermal conduction in segmented silicon nanowires", *Nanoscale*, 11(28), 13407-13414. <http://doi.org/10.1039/C9NR03863A>, (2019)

[2] Sergei Gluchko, Roman Anufriev, Ryoto Yanagisawa, Sebastian Volz and Masahiro Nomura, "On the reduction and rectification of thermal conduction using phononic crystals with pacman-shaped holes", *Appl. Phys. Lett.* 114, 023102 (2019); doi: 10.1063/1.5079931

[3] George, A., Yanagisawa, R., Anufriev, R., He, J., Yoshie, N., Tsujii, N., et al. (2019). Thermoelectric Enhancement of Silicon Membranes by Ultrathin Amorphous Films. *ACS Applied Materials & Interfaces*, 1-5. <http://doi.org/10.1021/acsami.8b21003>.

[4] X. Huang, S. Gluchko, R. Anufriev, S. Volz and M. Nomura, "Thermal Conductivity Reduction in Silicon Thin Film with Nanocones", *ACS Applied Materials & Interfaces*, 11, 37, 34394-34398, (2019)

[5] Y Ni, H Zhang, S Hu, H Wang, S Volz, S Xiong, "Interface diffusion-induced phonon localization in two-dimensional lateral heterostructures", *International Journal of Heat and Mass Transfer* 144, 118608, (2019)