

Title (en)

PHONONIC METAMATERIALS ADAPTED FOR REDUCED THERMAL TRANSPORT

Title (de)

FÜR VERMINDERTEN WÄRMETRANSPORT ANGEPASSTE PHONISCHE METAMATERIALIEN

Title (fr)

MÉTAMATÉRIAUX PHONONIQUES ADAPTÉS À UN TRANSPORT THERMIQUE RÉDUIT

Publication

EP 3776676 A4 20220427 (EN)

Application

EP 19788041 A 20190417

Priority

- US 201815956289 A 20180418
- US 2019027811 W 20190417

Abstract (en)

[origin: WO2019204393A1] Phononic metamaterials and methods for reducing the group velocities and the thermal conductivity in at least partially crystalline base material are provided, such as for thermoelectric energy conversion. In one implementation, a method for reducing thermal conductivity through an at least partially crystalline base material is provided. In another implementation, a phononic metamaterial structure is provided. The phononic metamaterial structure in this implementation includes: an at least partially crystalline base material configured to allow a plurality of phonons to move to provide thermal conduction through the base material; and at least one material coupled (e.g., as an inclusion, extending substructure, outer matrix, a coating to heavy inner inclusion, etc.) to the at least partially crystalline base material via at least one relatively compliant or soft material (e.g., graphite, rubber or polymer). The inclusion, extending substructure matrix or coating material is configured to generate at least one vibration mode by the oscillation of at least one atom within the resonating material to interact with the plurality of phonons moving within the base material and slow group velocities of at least a portion of the interacting phonons and reduce thermal conductivity through the base material.

IPC 8 full level

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CPC (source: EP)

H10N 10/17 (2023.02); **H10N 10/855** (2023.02); **H10N 10/857** (2023.02); **B82Y 20/00** (2013.01)

Citation (search report)

- [XD] US 2017125656 A1 20170504 - HUSSEIN MAHMOUD I [US]
- [A] US 2015015930 A1 20150115 - HUSSEIN MAHMOUD I [US], et al
- [A] US 9419198 B2 20160816 - YU JEN-KAN [US], et al
- [A] US 9595653 B2 20170314 - MITROVIC SLOBODAN [US], et al
- See references of WO 2019204393A1

Designated contracting state (EPC)

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