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Simulation and Experimental Realization of a Nano-scale Thermal Cloak. XUE BAI, NUS Graduate School for Integrative Sciences and Engineering, National University of Singapore, Kent Ridge 119620, Republic of Singapore. , XIANGFAN XU, Center for Phononics and Thermal Energy Science, School of Physical Science and Engineering, Tongji University, 200092, Shanghai, China., BAOWEN LI, Department of Mechanical Engineering, University of Colorado, Boulder, Colorado 80309, USA, XUDONG CHEN, JOHN T. L. THONG, Department of Electrical and Computer Engineering, National University of Singapore, 4 Engineering Drive 3, Republic of Singapore — Manipulation of heat flow at microstructures plays an important role in modern industry, especially for electronic and optoelectronic devices, for their performance and reliability are highly temperature dependent. Analogous to the invisible cloak in transformation optics, the thermal cloak can hide objects from heat and realize isothermal region in transformation thermodynamics. However, due to the macro-scale thermal properties may not be suitable for nano-materials, the realization of the nano-scale thermal cloak highly relies on the thermal transport in nanostructures. Here, we report our recent work of the realization of nano-scale thermal cloak based on the thermal property study of nano- materials via a spatially resolved thermal resistance measurement technique. The simulation and experiment verified its maintenance of isothermal region and heat protection capabilities. This work may provide a new way to manipulate heat transport in nano-scale devices..

Xue Bai
Natl Univ of Singapore

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