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Edge currents and an array of nanopores in zigzag and chiral graphene nanoribbons as a route toward high-ZT thermoelectrics PO-HAO CHANG, Department of Physics and Astronomy, University of Delaware, Newark, DE 19716-2570, USA — We exploit peculiar transport properties of graphene nanoribbons (GNRs) with zigzag or chiral edges where local current density of quasiparticles close to the Dirac point is largely confined around their edges. Thus, drilling an array of nanopores in the interior of such nanoribbons will not affect much the electronic transport while substantially suppressing the phonon transport in sufficiently long wires. For nanoribbons of length ~ 1 μm and width 4.1 nm and nanopores of diameter 2 nm, the ZT for both zigzag GNRs and chiral GNRs is $\simeq 4$ at $T = 77$ K and $\simeq 1.5$ at $T = 300$ K. With slightly asymmetric arragement of nanopores, the ZT of zigzag GNRs can be further enhanced to reach $\simeq 13$ at T=77 K and $\simeq 5$ at T=300 K.

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