Abstract Submitted
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High Thermal Conducting Boron Arsenide: Crystal Growth and Characterization BING LV, YUCHENG LAN, TcSUH and Department of Physics, Univ. of Houston, XIQU WANG, TcSUH and Department of Chemistry, Univ. of Houston, QIAN ZHANG, TcSUH and Department of Physics, Univ. of Houston, YONGJIE HU, Dept. of Mechanical Engineering, Massachusetts Institute of Technology, ALLAN J. JACOBSON, TcSUH and Department of Chemistry, Univ. of Houston, DAVID BROIDO, Department of Physics, Boston College, GANG CHEN, Dept. of Mechanical Engineering, Massachusetts Institute of Technology, ZHIFENG REN, CHING-WU CHU[1], TcSUH and Department of Physics, Univ. of Houston — Intrigued by recent calculations [Phys. Rev. Lett. 111, 025901(2013)] which predict a remarkably high thermal conductivity of $\sim$ 2,000 $Wm^{-1}K^{-1}$, comparable to that of diamond, in cubic boron arsenide (BAs) crystals, we have succeeded in synthesizing single crystals of BAs with a zinc blende structure and lattice parameters of a = 4.7830(7) Å characterized by X-ray single crystal diffraction and transmission electron microscopy (TEM). A relatively high thermal conductivity is obtained but still smaller than the predicted value. We attribute the difference of thermal conductivity value to the defect scattering associated with crystal twinning and As vacancies, verified both from experimental evidence and theoretical calculations. The predicted super-thermal-conductivity may be achieved in BAs single crystals with further improvement of crystal growth by removing the defects.

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