## Abstract Submitted for the MAR09 Meeting of The American Physical Society

Thermopower measurements of arrays of trigonal bismuth nanowires: the density, mobility, and charge-sign of Bi surface carriers.<sup>1</sup> TITO HUBER, AJIBOLA ADEYEYE, TOSIN ODUNFA, Howard University, ALLA NIKOLAEVA, LEONID KONOPKO, Academy of Sciences. Moldova, RYAN JOHNSON, MICHAEL GRAF, Physics Department. Boston College — We investigated the thermopower S of Bi nanowires with 20 nm < diameter < 200 nm) between 4 K and room temperature in well-characterized samples. Shubnikov-de Haas oscillations give evidence of light-effective-mass bulklike carriers, Dirac electrons and holes, and also high-effective-mass surface carriers. The latter are likely related to the surface states that are observed using ARPES of Bi surfaces (Hofmann, Prog. Surf. Sci. 81, 191 (2006)). Whereas the bulklike carriers's concentration decreases for decreasing diameter in accordance with theoretical predictions (Lin, Sun, and Dresselhaus, Phys. Rev. 62, 4610 (2000)) for the quantum-confinement-driven semimetal-to-semiconductor transition, the surface carrier concentration is relatively independent of diameter. S exhibits a trend from positive towards negative values as the diameter decreases from 200 nm to 35 nm. The measurements are interpreted in terms of the diffusion thermopower model. We find that the S of the semiconductor nanowires is dominated by surface electrons.

<sup>1</sup>National Science Foundation. DMR. PREM Program.

Tito Huber Howard University

Date submitted: 21 Nov 2008

Electronic form version 1.4