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Transport and optical properties of electrochemically fabricated Bi nanowires¹ HONG ZHANG, HAIDONG LIU, ZUXIN YE, WENHAO WU, SERGUEI JEREBTSOV, ALEXANDRE KOLOMENSKI, HANS SCHUESSLER, Texas A&M University — We present transport and optical studies of Bi nanowires electrochemically deposited into porous aluminum oxide (AAO) membranes. The Bi wires have nominal diameters of 20~100 nm and length of 60 μm . For transport measurements, electric contacts with negligible contact resistance were formed on single Bi nanowires *in-situ* during electrochemical deposition. The temperature dependence of the resistance of Bi single nanowires in AAO showed a semiconductor-semimetal transition when the samples were cooled below 50 K. The transverse magnetoresistance increases monotonically up to the highest available field of 8 T, while the longitudinal magnetoresistance tends to flatten at high field values. For optical measurements we first etched away the membranes and suspended Bi nanowires in water and then collected Bi nanowire on glass substrates. Coherent optical phonons were studied in Bi nanowires using a femtosecond pump-probe technique. The frequency of the excited phonon oscillations was found to be 2.35 THz at a pump fluency of 10 mJ/cm².

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