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Peculiarities of Seebeck Effect in Strained Bismuth Nanowires

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The results on the effect of strain on the electrical resistance and thermopower of Pyrex-coated Bi nanowires were presented. The properties of Bi nanowires are examined in the light of a strain induced electronic topological transition. At low temperatures, the thermopower dependences on strain exhibit a non-monotonic behavior inherent in thinner wires, where the thermopower is dominated by the diffusion transport mechanism of holes. The hole-dominated transport can be transformed into electron-dominated transport through a smooth manipulation with the phonon spectrum and Fermi surface by applying a uniaxial strain. A fairly high value of the thermoelectric power factor was found above $T = 80$ K, where the dominant mechanism contributing to the thermopower is diffusive thermoelectric generation with electrons as the majority carrier.