Piezo/photo-electricity of SbSI nanowire heterostructure

Abstract

Heterostructure ferroelectric antimony sulfoiodide (SbSI) nanowires and titanium dioxide (TiO_2) / molybdenum disulfide (MoS_2) / graphene nanoparticles was synthesized, studied and proposed energy harvester applications. SbSI nanowires were fabricated under ultrasonic treatment. Sonochemical synthesis was performed in the presence of TiO_2/MoS_2/Graphene nanoparticles. The crystalline one-dimensional (1D) structure of the SbSI heterostructure was confirmed using high resolution transmission microscopy (HRTEM). The morphology and chemical composition of the material were examined by applying scanning electron microscopy (SEM) and energy-dispersive X-ray spectroscopy (EDS), respectively. The direct energy band gap was determined for heterostructure using diffuse reflectance spectroscopy (DRS). The results were presented for different concentrations of nanoparticles. Polymer matrix nanocomposites containing heterostructures were developed. The results for mechanical excitation and lighting are presented. Differences in voltage responses for various heterostructures have been demonstrated. The presented devices can be used as multiphysical energy harvesters.

Speaker Bio

Bartłomiej Nowacki receive MSc in Mechatronics with honors at the Faculty of Electrical Engineering at the the Silesian University of Technology (Gliwice, Poland) in 2021. He is currently PhD student at Department of Industrial Informatics at Faculty of Materials Engineering. His research interests are focused on the use of nanomaterials in sensory systems. In the mainly on nanocomposites with piezoelectric and photoelectric properties.