Subarea POB3.1: Organic and inorganic materials and carbon nanostructures for applications in electronics

Title of the presentation: Ferroelectric nanomaterials $A^{15}B^{16}C^{17}$

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Abstract: All ferroelectrics are pyroelectric and therefore they are piezoelectric too. Some of them are semiconductors known as photoferroelectrics. These materials are not only interesting objects of scientific investigations but also have many potential applications due to their multiple various properties dependent on temperature, electric field, illumination, physical force, and ambient environment.

In this presentation, the works performed in Solid State Physics Division of the Institute of Physics – CSE at Silesian University of Technology are shown. They include the sonochemical fabrication technology of ferroelectric $A^{15}B^{16}C^{17}$-type nanomaterials, determination of material parameters as well as structuring and investigations of performance of nanodevices composed from the fabricated materials.

We produce the following nanoproducts: quantum dots (e.g. SbSI), nanowires (e.g. SbSI, SbSeI, $SbS_{1-x}Se_xI$), nanowires inside carbon nanotubes (e.g. SbSel@CNT), films of oriented nanowires (e.g. SbSI), composites (e.g. cellulose/SbSI nanowires) and photonic crystals (e.g. SbSI inverted opal). We collaborate with researchers from other institutes to fabricate different composites (e.g. PAN/SbSI fibers) and compressed nanowires (e.g. SbSeI).

We fabricate gas nanosensors, nanophotodetectors, photovoltaic cells, pyroelectric nanogenerators, piezoelectric nanogenerators, and pressure sensors. We investigate the applicability of our nanoproducts as photocatalysts, pyrocatalysts, and piezocatalysts.

The result of these works is: 8 patents, 56 papers in JCR journals, 5 book chapters published abroad.

In our laboratory, we also investigate the optical, electrical, photoelectric, piezoelectric and pyroelectric properties of nanomaterials fabricated in other institutes and universities.