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The field sensors made of graphene and carbon nanotube quantum dots

The talk is devoted to sensors and spectral analyzers made of graphene and carbon nanotubes. Among variety of sensors which can probe electric and magnetic fields, chemical, and biological substances the THz field sensors occupy a special place. Implementation the THz waves (T-rays) brings considerable advantages in various areas of human activity, including the medicine, space research, defense and security. In the talk I review the T-ray quantum dot sensors and spectral analyzers which are currently under study. An attention is paid to basic physical mechanisms and principles of the T-ray sensing. Along with the graphene and carbon nanotube quantum dot sensors, I also will briefly describe the bolometric and non-linear T-ray devices. A list of crucial requirements to the quantum dot devices includes not only common characteristics like the contact resistance, charge transfer length, or operational temperature, but also the nanotube diameter and chirality, as well as the shape and width of the graphene stripe edges. The methods to increase the degree of intrinsic coherence in the carbon nanotube and graphene sensors are presented also. Implementing those approaches and methods allows to make the graphene and carbon nanotube devices much more capable comparing to regular semiconducting quantum dots. Other relevant problems to consider are related to various THz circuit elements including the THz lenses, mirrors, T-ray transmission lines, THz metamaterials, etc.

Biography

Serhii Shafraniuk is present working as a Research Associate Professor at Northwestern University, USA. He has completed his Ph.D. 1985 from Kiev University and his research work mainly focuses on nano-physics, particularly the electromagnetic and far-infrared properties of graphene and carbon nanotube junctions.

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