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Structural and optical properties of Cu-doped zinc oxide nanostructures

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1. Research problem
- Determination of the influence of metal nanoparticles on the optical and electronic properties of semiconductor nanostructures – plasmonic effects
- The study of optical and electronic properties of semiconductor nanostructures doped with metal
- Investigation of transport and recombination of the electron at the interface and in doped structures

2. Materials and methods
- **Numerical simulations** - performed by employing a Finite Integration Technique (CST Microwave Studio) – the study of plasmonic light's absorption enhancement and coupling in the system consisted of **silicon nanowire-gold bow-tie nanostructure** [1] and **zinc oxide nanowire-gold nanoparticles** of different shapes
- **Materials Synthesis**– Zinc oxide nanowires undoped and doped with copper [2,3], gold nanoparticles with different shapes (spheres, rods, triangles) [4,5].
- **Characterization Techniques**-Scanning and Transmission Electron Microscope (SEM,TEM), X-ray diffraction (XRD), absorption (ABS) and photoluminescence (PL) measurements, nanoindentation, Raman spectroscopy, Atomic Force Microscopy (conductive mode), X-ray photoelectron spectroscopy (XPS) Electrochemical Impedance Spectroscopy (EIS), Small-Perturbation Techniques (intensity-modulated photocurrent and photovoltage spectroscopy – IMPS, IMVS).

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[1] E. Robak, M. Kotkowiak, H. Drozdowski, *J. Phys. D: Applied. Phys.* **49** (4) (2016) 045104.
[2] E. Robak, E. Coy, M. Kotkowiak, S. Jurga, K. Zaleski, H. Drozdowski, *Nanotechnology*, **27** (17) (2016) 175706.