- **Nanocomposites and nanomaterials**

Photoelectric properties of Au/porous-GaAs Schottky barriers

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Composite nanomaterials based on porous semiconductors attracted great interest in optoelectronics and photovoltaics due to unique optical and electronic properties which are different from the bulk materials [1]. Widely used Au/GaAs Schottky barriers, prepared on the base of porous GaAs, usually showed a non-ideal I(V) behavior with an ideality factor greater than unity due to the existence of high density of surface states [2]. In contrast to electrical properties of Au/porous-GaAs which are more or less investigated, the photoelectric properties are poorly studied. Therefore this work is mainly devoted to the study of photoelectric properties of the Au/porous-GaAs structures in combination with electric ones helping to understand the photocurrent behavior.

Porous GaAs with different thickness have been prepared from n-type (100) GaAs single crystals with ~10^{18} cm^{-3} doping level by anodization in electrolyte containing HCl. Au barrier contacts with 30 nm thickness have been deposited by thermal evaporation in vacuum. Surface morphology and pore structure have been analyzed by SEM. Photoelectric and electric properties of structures have been studied with help of short-circuit photocurrent spectra in the 0.4-0.9 μm spectral range and forward/backward I(V) and C(V) characteristics.

Porous GaAs layer is characterized by increased light absorption due to microrelief surface and light trapping effect. It has the increased resistivity, increased surface state density and as a result increased surface recombination. Light trapping effect increases photocurrent of Au/porous-GaAs Schottky barrier while increased surface recombination decreases it. The total effect of porous layer on photocurrent depends on which process predominates. Therefore on the structures with thin porous layer we get increased photocurrent compared to the Au/GaAs structures with flat interface while for structures with thick porous layer the photocurrent is lower.

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2. *Saghrouni H., Hannachi R., Jomni S., Beji L.* Electrical investigation of the Au/n+–GaAs and Au/n-porous GaAs structures // Physica B: Condensed Matter.-2013.-**422**.-P. 64-71.