

# IMPEDANCE SPECTROSCOPY OF GeSn/Ge/Si STRUCTURES AT DIFFERENT TEMPERATURES

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Structures with GeSn films of different thicknesses CVD-grown on Ge/Si substrates were studied by temperature-dependent spectroscopy of impedance  $Z = Z_1 + iZ_2$  within 1 - 1000 kHz. At lower temperatures, the films revealed insets of the photosensitivity characteristic for interband excitation of GeSn, Ge (direct bandgap) and Si. From the frequency dependencies of real  $Z_1$  and imaginary  $Z_2$  parts of the impedance, the conductances and carrier relaxation times of the structures at temperatures from 80 to 300 K were extracted. The structures with GeSn films are found to have low-temperature conductivities two order higher and, respectively, relaxation times two order faster than the reference substrate Ge/Si (without GeSn), which reveals an ordinary semiconductor-like temperature dependence of conductance slowly rising at lower temperatures and highly increasing above ~200 K following  $\sim \exp[-E/(kT)]$  with the activation energy  $E$  of ~350 meV, which is close to the half of Ge bandgap near 0 K. Contrarywise, the dependences for the GeSn/Ge/Si structures are non-monotonous, passing a minimum at higher temperatures, which is attributed to higher (metal-like) GeSn conductivity. The impedance measurements under illumination within the Si interband excitation show that the photoconductivity versus temperature has a peak at the range of the dark conductance minimum. The data are explained within the ideas of the conductivity of multilayered structures.

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## Type of presence

Presence at Taras Shevchenko National University

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