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Comparison of secondary-ionic and electronic photoemission on films CdS-PbS in visible and middle infra-red

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Opening of a secondary-ionic photoeffect (SIPE) on photoconducting targets in visible area of spectrum has made actual search of analogies in other areas of spectrum of electromagnetic oscillations. As a subject of such analogy the optical phenomenon of the plasma resonance arising at a room temperature during measurement of optical reflexion in a middle infrared area of spectrum on photoconducting films CdS-PbS acts in this report. Such films have served as modelling substance for discovering SIPE developing of "opposition" of two phenomena: Reduction and increase in an output of secondary ions at illumination by visible light. The increase in an output of ions is connected, as has been shown, with swinging of a crystal lattice by energy of recombining electron-hole pairs created by illumination. We have assumed that similar action can render a plasma resonance on electronic gas of a semiconductor target, promoting an output of electrons in vacuum. Such external electronic emission will occur also at room temperature that will allows to create the high-speed detector and a radiation visual analyzer in average and probably distant infra-red area of spectrum. From this point of view reflexion spectra in the field of 8-12 microns containing a local minimum, correlating with a maximum of absorption of optical radiation characteristic for a plasma resonance are considered. There is no direct proof of increase in an output of electrons in vacuum at illumination from area of a middle infra-red. While in our disposal there are data about illumination influence in visible area of spectrum on an output of electrons from films specified above type on a tunnel microscope. Electron-microscopic researches and X-ray diffraction analysis show crystallite sizes in investigated films lie in a range of 50-500 nanometers that creates favorable possibility for tunnel electronic photoemission. As to a plasma resonance it testifies to presence of sites with high electron concentration (10^{18} - 10^{19} cm $^{-3}$) in the multiphase films representing a composite.

Biography

A G Rokakh graduated from Physical Department of the Saratov N.G. Chernyshevsky State University in 1957 and continued his work as a scientific researcher and a teacher. He is a professor of the nano- and biomedical technology department of the mentioned university. He has above 350 publications in various fields, mainly in semiconductor physics. He was a member of the desk board of the international journal Physics Express and a nominator of Prof. A. G. Rokakh Award for the best paper in semiconductor physics of the same journal; the full member of the American Nano Society.

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