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A method for gas analysis in nonlocal plasma of a short argon microdischarge¹ ANATOLY KUDRYAVTSEV, St. Petersburg State University, MARGARITA STEFANOVA, PETKO PRAMATAROV, Institute of Solid State Physics, Sofia, Bulgaria — Recently developed collisional electron spectroscopy (CES) method allows identification of gas impurities in a main gas in nonlocal plasma, where the different groups of electrons do not relax in energy by collisions in the volume and behave independently of each other. The fast electrons, released in processes of Penning ionization of the impurity particles by main gas metastable atoms, give narrow peaks in the EEDF near the energy of their appearance. Selective registration of groups of fast nonlocal electrons created in Penning ionization of the impurity atoms or molecules by metastable argon atoms is carried out. Argon is used as a main gas. The negative glow plasma of a short dc microdischarge at medium pressures is used as most suitable medium for nonlocal formation of the EEDF. Penning reactions with known gas impurities and sputtered cathode metal atoms are registered. The obtained maxima in the EEDF appear at the characteristic energies corresponding to the expected maxima for penning electrons of the known gas impurities used. This experiment contributes to the development of new microdischarge gas analyzer for gas impurities detection, whose dimensions can be dramatically reduced, compared to the exciting devices.

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