SURFACE IONIZATION OF MELAMINE MOLECULES ON THE RHENIUM AND TUNGSTEN EMITTERS

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Surface ionization, the ionization of atoms or molecules on the surface of high-temperature metals, is widely used in materials science and gas analytical instrumentation. Heterogeneous chemical processes occurring on the heated surface of metals with high work functions, such as tungsten (W) and rhenium (Re), are notable for their uniform progression and the long-term stability of their catalytic properties at high temperatures. In the literature, the work functions of W and Re emitters are reported to be 4,59-4,62 eV and 4,8-5,3 eV, respectively, which are higher compared to other metals. These values can be further increased up to 5,8-6,5 eV for W emitters and 6,5-7 eV for Re emitters by forming an oxide layer on the surface, based on the developed methodologies [1]. To find and develop stable emitters for organic compounds is essential for the further development of the SI method.

The experiments were conducted using the MИ-1201B static magnetic mass spectrometer, which was modified for the SI method [2]. W and Re ribbons (0.05x1.0x16.0 mm³) were used as a thermoemitter to generate a positive ions of studied compond. The temperature of the thermoemitters was controlled in the range of 600 K to 1250 K. Air was supplied as an oxygen gas in the Re experiments to prevent the emitter surface from being "poisoned". The melamine molecule (C₃H₆N₆) was studied using metallic and oxidized W and Re emitters. The stability and efficiency of these emitters were evaluated. The SI mass spectra and temperature dependence of ion currents were obtained, and the sublimation energy Esub of melamine was estimated.

References

1. Zandberg E. Ya. Et al. Jour. of Tech. Phys..1976. Т. 46. №. 4. p. 832.
2. Akhunov S. et al. Europ. Jour. of Mass Spec.. 2021. Т. 27. №. 1. p. 29-38.