

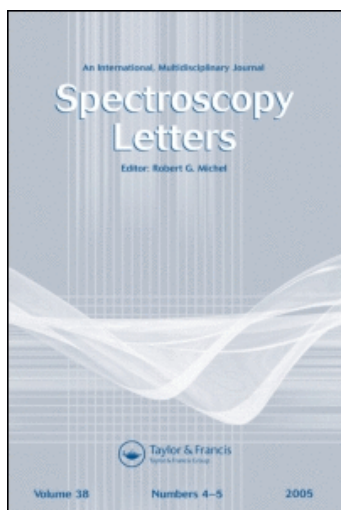
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DISCHARGE TUBE WITH TRANSPARENT HOLLOW CATHODE

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ABSTRACT

In some cases the spectroscopic investigation of electrode phenomena in the plasma and of the plasma itself is hampered by the nontransparency of the metal electrodes. The use of perforated electrodes is not very expedient and is only a partial solution. The same problem arises in the cases of spectral investigations of the discharge in hollow cathode. The aim of the present communication is to give a possibility to replace the metal electrodes with conductive transparent layer.

EXPERIMENTAL AND RESULTS

The SnO_2 transparent conductive layer was deposited on the glass substrate. This layer has sufficient transparency and high adhesion due to the technologically created strong connection Si-O-Sn . In order to increase the transparency and conductivity of the layer the alkali

ions were substracted from the glass plate and NH_4F was added. As a result the layer has a conductivity of 10% and reaches a transparency of 87%. The experimental setup is a glass tube (Fig. 1) with sealed glass windows whose internal surfaces are covered with transparent conductive layer. The distance between the electrodes-windows is 30 mm. Supply voltage is applied to them by silver contacts. The He pressure in the tube was 0,1 torr and the discharge current-5 mA and 10 mA. The intensity of the lines He501,6 nm and He492,2 nm was registrated trough the electrodes-windows. The discharge is studied mostly in hollow cathode regime but comparative measurments

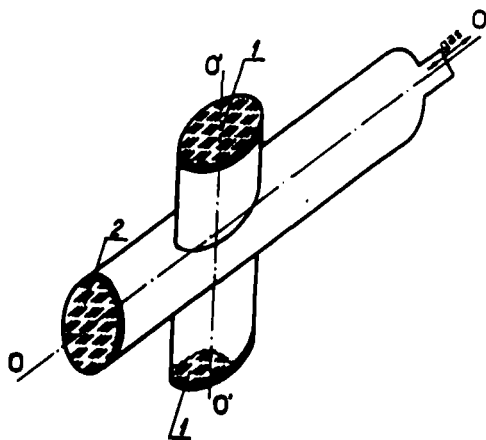


FIG. 1

Discharge tube

1,2-electrodes-windows

have been done in positive column too. In the first case the positive voltage is applied to the electrode - window 2, the negative voltage - to the pair electrodes - windows 1; in the second case the pair 1 is cathode and anode simultaneously and 2 is not charged at all.

The data for line intensity dependence in hollow cathode regime at a given polarization on the magnetic field directed along the axis OO , OO and also perpendicular to them were obtained. The windows-electrodes 1 give the possibility for observation in the direction OO' which in this case is decisively important. The data obtained are related to the role of anisotropically distributed electrons in the mechanism of creating coherency of type "alignment" in the hollow cathode discharge between the magnetic sublevels of 3^1P_1 - and 4^1D_2 - states^{1,2}. However the discussion of these data is not the purpose of the present communication.

At the end we would like to say that the transparent layer deposited on the internal surface of the glass tube given the possibility for more detailed investigation of the classical type of discharge in the cylindrical hollow cathode.

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