Normal Mode of DC Glow Discharge

VALERIY LISOVSKIY,
Kharkov National University, 4 Svobody sq., Kharkov, 61077, Ukraine, NADIA KHARCHENKO, VLADIMIR YEGORENKO

We registered the normal current density \( j \) of the dc glow discharge in the nitrogen pressure range \( p = 0.3 - 10 \) Torr and determined the quantity \( j/p^2 \). Experiments were carried out in a T-shaped tube, the cathode was located at one end of the horizontal part of T, whereas another electrode (anode at the bottom of T) was grounded. Photos were taken through a window at the opposite end of the horizontal part of T exposing the cathode and the images were digitized. According to a generally accepted opinion this quantity \( j/p^2 \) had to remain constant on varying the current \( I \) in the normal mode. This proved to be valid only for \( p < 1 \) Torr. At higher pressure values the current growth was accompanied with a decrease of the quantity \( j/p^2 \). In a plasma column of small cross section the current density is larger to compensate for the increased loss of charged particles from the discharge volume.