

Influence of the electrolytic cathode temperature on the self-sustaining mechanism of plasma-electrolyte discharge

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Abstract

© 2018 IOP Publishing Ltd. The work is focused on studying the low-voltage (0-350 V) gas discharge with a liquid electrolytic cathode at various temperatures of an electrolyte. An aqueous solution of sodium hydroxide was used as a liquid cathode. The change in the discharge structure with increasing temperature is revealed, in particular, the transition from the bulk diffusive discharge to the leader discharge. The increase in the electrolyte temperature leads to the decrease in the intensity of hydrodynamic perturbations down to their disappearance. In addition, the anomalous growth of the vapor-air space between the metal anode and liquid cathode is observed. The key discharge parameters forming the anomalous growth are determined and the mechanism of vapor-air shell growth is proposed.

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Keywords

anomalous growth of a foamed vapor-air shell, contact glow discharge electrolysis, leader structure, non-equilibrium plasma, plasma-liquid interaction

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