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Influence of gas and liquid condition on characteristics of self-organized pattern formation observed in atmospheric DC glow discharge[1]
NAOKI SHIRAI, HIROYUKI HIRAHARA, SATOSHI UCHIDA, FUMIYOSHI TOCHIKUBO, Tokyo Metropolitan University — Self-organized anode patterns were observed on the surface of a liquid anode when an atmospheric dc glow discharge with helium flow was generated. The pattern formation depends on current, gap length, and helium flow rate. With increasing discharge current or gap length, an anode luminous spot changed to self-organized patterns. Anode pattern formation also depends on liquid conductivity. Although the mechanisms of this pattern formation have not understood completely, we assume that the patterns depend on electronegative gas in the gap and temperature of liquid anode. In this study, we investigate anode pattern formation of the discharge by changing gas condition around the discharge and liquid temperature. When mole fraction rate of oxygen or carbon dioxide is increased, pattern formation is observed. On the other hand, when mole fraction rate of nitrogen is increased, pattern is not observed. If liquid temperature increases, pattern formation changes from dot pattern to stripe pattern.

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