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Atmospheric dc glow discharge using liquid anode for production of nano-particle NAOKI SHIRAI, SATOSHI UCHIDA, FUMIYOSHI TOCHIKUBO, Tokyo Metropolitan University, TOKYO METOROPOLITAN UNIVERSITY TEAM — Non-thermal plasma in and with liquids has attracted considerable interest for its potential use in a wide range of applications. In particular, the use of a discharge with a liquid as an electrode for material processes has been reported. In this study, we focused on atmospheric glow discharge using liquid as anode, and the production of nano-particle by the atmospheric plasma reduction of aqueous cations. When atmospheric dc glow discharge with helium flow was generated, self-organized anode patterns were observed on the liquid. The pattern formation depends on the current, gap length and helium flow rate. With increasing discharge current or gap length, anode luminous spot changed to self-organized patterns. Anode pattern formation depends on the liquid conductivity. When $AgNO_3$ solution is used as liquid anode of the discharge, the liquid changed dark color near the plasma-liquid interface. We confirm the dark region including nano-particle which diameter is about 5-50 nm by TEM observation. The liquid anode discharge reduction of aqueous cations is specific and different from typical electrolysis. The diameter of nano-particle is changed by current, discharge time and addition of surface-active agent to liquid.

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