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Characteristics of Liquid Flow Induced by Atmospheric Pressure DC Glow Discharge with Liquid Electrode[1] FUMIYOSHI TOCHIKUBO, TAKUYA AOKI, NAOKI SHIRAI, SATOSHI UCHIDA, Tokyo Metropolitan University — In the application of atmospheric-pressure discharges in contact with liquid, primary reactions are initiated between radicals and liquid molecules at plasma-liquid interface. Since the diffusion in the liquid is very slow, some convective flow is necessary to exchange the chemicals at the plasma-liquid interface for the efficient reactions. In our previous work, we found the appearance of specific downward flow in the liquid just below the dc glow discharge in contact with liquid. This downflow will be effective for exchanging the chemicals at plasma-liquid interface. In this work, we investigated the characteristics of liquid flow induced by atmospheric-pressure dc glow discharge with liquid electrode in detail; the influence of voltage polarity, current amplitude, liquid conductivity, the electrode arrangement, and so on. The spatiotemporal development of liquid flow was visualized by schlieren method, and the temperature distribution was measured using temperature-sensitive liquid crystal particles dispersed in the liquid. The liquid-flow characteristics was reproduced by a fluid simulation considering a downward driving force at liquid surface from plasma. The candidate of the driving force will be the momentum transfer of charged species at the liquid surface.

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