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**Numerical simulation of plasma-induced electrolysis utilizing dc glow discharge**[1] FUMIYOSHI TOCHIKUBO, NAOKI SHIRAI, SATOSHI UCHIDA, Tokyo Metropolitan University, TATSURU SHIRAFUJI, Osaka City University — In this work, we carried out one-dimensional numerical simulation of plasma-induced electrolysis, which consists of atmospheric pressure dc glow discharge and electrolyte solution connected in series. Grounded metal electrode is placed at the bottom of NaCl solution with 1 mm depth while powered electrode is placed at 1 mm above the solution surface. The gap is filled with helium. Continuity equations of charged species both in gas and in liquid were simultaneously calculated with Poisson's equation. Current continuity is considered at plasma-liquid interface. That is, hydrated electrons equivalent to electron flux from plasma, or $H_2O^+$ ions equivalent to positive ion flux from plasma are supplied in the liquid at plasma-liquid interface. The calculated gas-phase discharge structure is essentially the same as that between two metal electrodes. In front of the metal electrode in liquid, the electric double layer (EDL) with thickness of approximately 10 nm was formed to maintain the electrode reaction. However, the EDL was not formed at the liquid surface in contact with dc glow discharge, because charges are forcibly supplied from plasma to liquid. In other words, plasma-induced electrolysis is controlled at plasma-liquid interface by plasma.

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