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Generation of Discharge Plasma in Gas-Liquid Slug Flow KAKERU MANO, YUI HAYASHI, NORIHARU TAKADA, HIDEKI KANDA, MOTONOBU GOTO, Naoya University — Discharge plasma in contact with aqueous solution has been attracted attention in the application of wastewater treatment nanoparticles generation and medicine. A lot of methods of electric discharge over aqueous solution surface were researched, but contact area between plasma and aqueous solution was small on these methods. Therefore, some methods generated discharge plasma inside bubbles to enlarge contact area of plasma. However, bubbles were difficult to control because of sheer force and buoyancy in these studies. Namely, the discharge conditions varied temporally. We proposed the discharge method using gas-liquid slug flow in the same direction to control bubbles. Slug flow had the gas phase and liquid phase and these were arranged regularly and flow forward in the same direction. Therefore, this study have potential to generate discharge plasma continuously. In the experiment, the discharge plasma was generated linearly along the inner surface of bubble continuously while flowing the gas-liquid slug. All bubbles between electrodes had plasma emission. Optical emission of feed gas (Ar, He, O_2 and N_2) were observed respectively and emission of OH radical and H_α were also observed. Especially, emissions of OH radical were intense relatively. OH radical has high decomposition ability, thus 4-nitroacetanilide was degraded. The decomposition ratio reached 80% by using Ar or O_2 slug flow. However, by using N_2 slug flow, the decomposition ratio reached only 50%.

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