

Abstract Submitted  
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**Generation of Radio Frequency Plasmas in Pure Water within Hole in Insulating Plate** TSUNEHIRO MAEHARA, Ehime University, SHINYA MATSUTOMO, National Institute of Technology, Niihama College, SHIN YAMAMOTO, SHINOBU MUKASA, AYAKA TANAKA, AYATO KAWASHIMA, Ehime University — Recently, various types of plasmas in water have been investigated. In some cases, it has been observed that plasmas in water are not in contact with the metal electrodes. In these systems, no metal electrodes contaminate water. Our research group has carried out experimental investigations on RF plasma enclosed in a bubble within a hole in an insulating plate. RF power was applied between two electrodes, and an insulating plate was placed between them. RF plasmas in pure water (0.2mS/m) and 1 wt% NaCl solution can be generated within the hole, apart from the electrodes. When hole diameter is 3-10 mm, the plasmas can be maintained stably. From finite element method, the electric field and heat density before breakdown were estimated, and on the basis of those calculations it was shown that bubble formation is a key factor for plasma generation, that is, in both the cases, the existence of a bubble increases the electric field at the side of the bubble increases. These facts suggest plasma generation occurs at around the side of the bubble. However, solution can be treated as a conductor in 1 wt% NaCl solution. On the other hand, in pure water, water behaves as an insulator. Therefore, different mechanisms lead to the plasma generation.

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