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We have previously proposed a novel three-dimensionally integrated micro solution plasma (3D IMSP) reactor, which can generate large number of microplasmas in a porous dielectric material filled with a gas/liquid mixed medium. However, 3D IMSP is not effective for the treatment of an aqueous solution with a high electrical conductivity, which was one of disadvantages of 3D IMSP. In this work, we have introduced micro argon bubbles into the 3D IMSP reactor to treat water with higher electrical conductivity. We employed argon micro-bubbles for overcoming the weak point of the 3D IMSP reactor. The aqueous solutions used for this experiment had electrical conductivities of 1-1000 uS/cm, which were prepared by mixing KCl with deionized water and methylene blue. We confirmed that the micro-bubble assisted 3D IMSP reactor can generate plasma in the aqueous solution with electrical conductivity up to 500 uS/cm, while conventional 3D IMSP cannot. Furthermore, micro-bubble assistance has an effect of reducing the ignition- and sustain-voltages of 3D IMSP.

This work was partly supported by JSPS/MEXT KAKENHI Grant Numbers 15H03585 and 15K13391.