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Generation of pulsed discharge plasma in water with fine bubbles YUI HAYASHI, NORIHARU TAKADA, HIDEKI KANDA, MOTONOBU GOTO, Nagoya University, GOTO LABORATORY TEAM — Recently, some researchers have proposed electric discharge methods with bubbles in water because the discharge plasma inside bubble was easy to be generated compared to that in water. Almost all of these methods introduced bubbles in the order of millimeter size from a nozzle placed in water. In these methods, bubbles rose one after another owing to high rising speed of millibubble, leading to inefficient gas consumption. We proposed fine bubbles introduction at the discharge area in water. A fine bubble is determined a bubble with less than 100 μ m in a diameter. Fine bubbles exhibit extremely slow rising speed. Fine bubbles decrease in size during bubble rising and subsequently collapse in water with OH radical generation. Therefore, combining the discharge plasma with fine bubbles is expected to generate more active species with small amount of gas consumption. In this work, fine bubbles were introduced in water and pulsed discharge plasma was generated between two cylindrical electrodes which placed in water. We examined effects of fine bubbles on electric discharge in water when argon or oxygen gas was utilized as feed gas. Fine bubbles enhanced optical emission of hydrogen and oxygen atoms from H_2O molecules, but that of feed gas was not observed. The formation mechanism of H_2O_2 by electric discharge was supposed to be different from that with no bubbling. Dissolved oxygen in water played a role in H_2O_2 formation by the discharge with fine bubbles.

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