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**Efficient bacterial inactivation in aqueous solution by low-temperature atmospheric pressure plasma application with a reduction of the solution pH** KATSUHISA KITANO, Osaka Univ., SATOSHI IKAWA, TRI Osaka, ATSUSHI TANI, Osaka Univ., NAOFUMI OHNISHI, Tohoku Univ., SATOSHI HAMAGUCHI, Osaka Univ. — With some medical applications in mind, bacterial inactivation experiments in aqueous solution have been performed with the use of low-temperature atmospheric pressure plasmas. We have successfully found that efficient bactericidal activity can be achieved if the solution is sufficiently acidic. It is interesting to note that there is a critical pH value of about 4.7 for the bactericidal effects, below which the bacteria are efficiently inactivated and above which the bacteria are hardly affected by the plasma application. When the plasmas were exposed to *E. coli* suspensions at pH 5.2, 4.7, 4.2 and 3.7, D values were found to be 1.92, 0.96, 0.59, and 0.21 min., respectively, under our experimental conditions. It has been also found experimentally that the presence of superoxide anion radicals $O_2^-\bullet$in the solution is essential for bacterial inactivation by the plasma application. The critical pH value may be associated with p$K$a of the dissociation equilibrium between $O_2^-\bullet$and hydroperoxy radicals HOO$\bullet$, which is known to be approximately 4.8. The formation of radicals in solution by such plasma has been confirmed from ESR (Electron Spin Resonance) with spin trapping agents. The ambient gas has been found to influence the radical formation in liquid significantly.

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