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Investigation
of
Sterilization Mechanism for Geobacillus stearothermophilus Spores with Plasma-Excited Neutral Gas
KEI MATSUI, NORIAKI IKENAGA, NORIYUKI SAKUDO, Kanazawa Institute of Technology — We investigate the mechanism of the sterilization with plasma-excited neutral gas that uniformly sterilizes both the space and inner wall of the reactor chamber at atmospheric pressure. Only reactive neutral species such as plasma-excited gas molecules and radicals are separated from the plasma and sent to the reactor chamber for chemical sterilization. The plasma source gas uses humidified mixture of nitrogen and oxygen. Geobacillus stearothermophilus spores and tyrosine which is amino acid are treated by the plasma-excited neutral gas. Shape change of the treated spore is observed by SEM, and chemical modification of the treated tyrosine is analyzed by HPLC. As a result, the surface of the treated spore shows depression. Hydroxylation and nitration of tyrosine are shown after the treatment. For these reasons, we believe that the sterilization with plasma-excited neutral gas results from the deformation of spore structure due to the chemical modification of amino acid.

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