Inactivation Mechanism of Single-Stranded DNA Bacteriophage Treated with Atmospheric Pressure Cold Plasma

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It is essentially important to understand interactions between atmospheric pressure cold plasma and living organisms for promoting the bio-medical application of the plasma. Bacteriophages are suitable for the study of such interactions because of their simple composition and structure [1] [2]. We have analyzed biological damages of both single strand and double strand DNA of M13 phage exposed to the plasma. The plasma caused damage to the phage DNA not only single strand break but also some chemical modification. The damage of double strand DNA was repaired *in vitro* by DNA repair enzymes, and ascorbic acid prevented the DNA degradation. DNA transfection assay revealed that single strand DNA is extremely susceptible to the plasma. Coat proteins of M13 phage proved to be more robust for the plasma treatment than the DNA using recombinant DNA experiments technique. We reached the conclusion that DNA damage is responsible for the plasma-inactivation of M13 phage.

References

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[2]H. Yasuda, T. Miura, H. Kurita, K. Takashima and A. Mizuno, Plasma Process. Polym., **7** (2010) 301