

# Bio-physical Analysis of yeast responses to non-thermal plasma at atmospheric pressure

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The study for application of plasma technology to eukaryotic microbes (yeasts, fungi, protozoa, etc.) has been recently reported in increasing number of studies [1][2]. In spite of an enormous number of studies on application of plasma, mechanisms for plasma action have been rarely investigated [3]. Understanding mechanisms of plasma action is essential for developing more efficient plasma technology. In this study, we analyzed responses of an eukaryotic microbe (yeast) to plasma using physical & biological methods as a first step for elucidating mechanisms of plasma action. Non-thermal Ar plasma at atmospheric pressure was used, and yeasts submerged in water or media (YPD) were treated with plasma. During plasma exposure, number of colony formation unit (CFU) was more dramatically decreased when yeasts were treated in DI (de-ionized) water than in YPD (Yeast-extract peptone dextrose) media. Yeast cells treated in DI water were shrunk more severely after plasma treatment. The amount of genomic DNA was decreased more rapidly in yeasts treated in DI water than in YPD media (longer than 1min.). Value of secondary electron emission coefficient ( $\gamma$ ) measured by  $\gamma$ -FIB (Gamma Focused Ion Beam) was increased upon plasma exposure, particularly in yeasts treated in water, indicating a possibility of damage on cell surface molecules. pH was significantly decreased in water after plasma treatment but not in YPD media suggesting that pH decrease might be a reason for yeast inactivation by plasma. However, we have also found a possibility that some factors directly from plasma can affect yeast responses and further study is on going for identifying these factors.

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## References

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