
Study of the penetration of active species from non-thermal atmospheric pressure plasma jet through a skin model using a UV-vis spectroscopy method

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Researches on non-thermal atmospheric pressure plasma skin treatment have continued for the last decades. These studies were sustained by the need for plasma medical and cosmetic fields. In order to use atmospheric plasma in these field, it is important to know the influence of active species generated from plasma on the skin. It is also necessary to know how effectively the generated active species diffuse to the skin.

At present, an artificial structure of a single structure like agarose is substituted by a cell model. In order to apply the plasma to the actual skin, it is necessary to experiment using a skin model somewhat similar to the actual one. In the case of actual skin, it consists of stratum corneum (SC), epidermis, and dermis layer. The SC which is the outermost shell layer is the main barrier that protects us from hazardous external substances from the environment. Therefore, the diffusion effect of plasma is different depending on the configuration of the skin model. Therefore, it is important to study the plasma effect in the skin model considering the SC which is the main shield of external reaction.

In this study, active species generated by jet type atmospheric pressure plasma equipment was analyzed in real time by UV - vis spectroscopy method according to plasma processing time and distance. Also, H₂O₂, NO₂⁻ and NO₃⁻ amount was quantified via curve fitting. And it was compared with the quantitative method by chemical method. In order to confirm the effect of actual plasma on the skin, we confirmed the penetration depth and range of active species according to skin model.