

〈一般論文〉

## TOF-SIMS による皮膚浸透経路の分析

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### Analysis of Transcutaneous Penetration Pathway Using TOF-SIMS

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#### Abstract

The purpose of this study is to analyze transcutaneous penetration pathway and rate of ingredients topically applied on human skin. To visualize the distribution of penetrated ingredients in stratum corneum non-invasively, a combination of adhesive tape stripping method and TOF-SIMS (Time-of-Flight Secondary Ion Mass Spectrometry) analysis was used. L-Ascorbic acid 2-phosphoric acid magnesium salt (APM) and sodium *dl*- $\alpha$ -tocopheryl phosphate (VEP), one of whitening ingredients, were selected as the evaluation target of transcutaneous penetration. APM and VEP were applied topically on the skin surface and then corneocytes were stripped from those area using adhesive tapes in series. These tape-stripping samples were subjected to TOF-SIMS analysis and the horizontal molecular distribution of tape, corneocytes, APM and VEP could be visualized respectively by two-dimensional mapping of each specific ion desorbed from the sample surface. APM and VEP were penetrated into the 7th stripped stratum corneum in 5 and 60 min, respectively and located mainly around the peripheral area of corneocytes, especially around clustered corneocytes. On the basis of these results, a combination of adhesive tape stripping method and TOF-SIMS analysis is considered to make it possible to analyze the transcutaneous penetration pathway and rate of ingredients. Furthermore, the evaluation method of transcutaneous penetration in this study may be a safe and effective method because it could non-invasively and directly detect the distribution of materials in the stratum corneum without a labeled substance.

**Key words:** transcutaneous penetration, TOF-SIMS, tape stripping.