

Characterisation of topical products and their fate post-application with label-free chemical imaging

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Introduction

Stimulated Raman scattering (SRS) microscopy is a valuable tool to assess formulated products. High resolution 3D chemical images can be acquired in 'real time' to reveal ingredient (co-)localization, crystalline phase, impurities and more. In addition, ingredients can be monitored post-

application to the skin, to reveal mechanistic information such as penetration pathway and direct visualisation of metamorphosis^{1,2}. Due to their non-destructive nature, they can also be performed in tandem with other methods.

SRS microscopy example data

Confocal Raman spectra to inform SRS imaging:



SRS imaging to generate SRS spectra for feature ID:



Drug permeation in skin

Metallic particles in skin

Drug crystallisation on skin



Drug CH₂ Amide I Collagen







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Correlative imaging with SIMS



Summary

- Label-free spectroscopic imaging can provide valuable insight to the chemical and structural properties of formulations, and their penetration into the skin, revealing new mechanistic insight and providing a new tool for product development 'troubleshooting'.
- Optical spectroscopy can be performed correlatively with other

optical modalities including mass spectrometry imaging, which provides complementary information.

References

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Department for Business, Energy & Industrial Strategy

FUNDED BY BEIS







Acknowledgements: This research was funded in part by the U.S. Department of Health & Human Services, Food & Drug Administration (1U01FD006533-01). The Analytical Chemistry Trust Fund and the Community for Analytical Measurement Science is gratefully acknowledged for a CAMS Fellowship to N.A.B. The National Physical Laboratory is operated by NPL Management Ltd, a wholly owned company of the Department for Business, Energy and Industrial Strategy (BEIS).

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