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Solid state extraction and chemical printing of biological tissue by gold nanoparticles-assisted laser ablation

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A solid state extraction method based on gold nanoparticles (AuNPs)-assisted laser ablation has been developed. Solid state extraction could preserve metabolites' spatial distribution in the tissue, which could have been lost if using conventional solvent extraction. A homogenous AuNPs film was first coated on a thin rat kidney tissue section, by restoring the coated tissue section with a UV laser, biomolecules were extracted, transferred and printed onto a supporting glass substrate (i.e., the printed sample). The printed sample was analyzed by imaging mass spectrometry, for revealing the identity and spatial distribution of the extracted biomolecules. Manly small metabolites were detected in the printed sample with well-preserved spatial distributions similar to those observed in the original tissue. Efficient laser-nanomaterial interaction of AuNPs, strong photo-absorption, laser-induced heating and laser-induced phase transition properties of the AuNPs, enabled this solid state extraction technology. We believed that AuNPs underwent a transiently molten state upon laser irradiation as supported by the color and morphological changes of the AuNPs after the laser ablation. This molten state and the subsequent re-solidification played a critical role in the *in situ* extraction process. It is anticipated that solid state extraction by AuNPs-assisted laser ablation could be successfully applied to different types of samples, especially when the preservation of original sample and analytes spatial distribution are critical, such as retaining limited biopsy while at the same time making a copy with the same analyte distribution for testing/diagnosis.

Biography

Kwan-Ming N G has completed his PhD (1999) in Analytical Chemistry from The Hong Kong Polytechnic University, studied on electrospray Ag(I) cationization mass spectrometry. He has completed his Post-doctorate in The Chinese University of Hong Kong (2000-2001) and The University of Hong Kong (2004-2006). Currently, he is an Assistant Professor of The Department of Chemistry at The University of Hong Kong. His major research interests include fundamentals of surface-assisted laser desorption/ionization, development and application of imaging mass spectrometry methods and development of new ionization methods for direct sample analysis.

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