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Combination of nano-material enrichment and dead-end filtration for uniform and rapid sample preparation in matrix-assisted laser desorption/ionization mass spectrometry

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ABSTRACT: Matrix-assisted laser desorption/ionization mass spectrometry (MALDI-MS) is a fast analysis tool for the detection of a wide range of analytes. However, heterogeneous distribution of matrix/analyte cocrystal, variation in signal intensity and poor experimental reproducibility at different locations of the same spot means difficulty in quantitative analysis. In this work, carbon nanotubes (CNTs) were employed as adsorbent for analyte cum matrix on a conductive porous membrane as a novel mass target plate. The sample pretreatment step was achieved by enrichment and dead-end filtration and dried by a solid-liquid separation. This approach enables the homogeneous distribution of analyte in the matrix, good shot-to-shot reproducibility in signals and quantitative detection of peptide and protein at different concentrations with correlation coefficient (R^2) of 0.9920 and 0.9909, respectively. The simple preparation of sample in a short time, uniform distribution of analyte, easy quantitative detection, and high reproducibility makes this technique useful and may diversify the application of MALDI-MS for quantitative detection of a variety of proteins.

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