# Novel surface assisted laser desorption / ionization mass spectrometry using carbon nanowalls for analyzing bio molecule

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Amino acids and proteins are important biomolecules related to a biological activity. Mass spectrometry (MS) is an effective tool that can analyze multiple biomolecules in tissue simultaneously. The matrix-assisted laser desorption / ionization mass spectrometry has been widely used for the analysis. However, signals from the organic matrix are observed at mass-to-charge ratio (m/z) of less than 700, and they are overlapped with signals from amino acids at m/z of less than 250, resulting that the analysis of amino acids is difficult.

In this study, we focused on surface assisted laser desorption/ionization (SALDI) mass spectrometry which can measure low mass region without use of the organic matrix. Carbon nanowalls (CNWs), which is carbon nano material, were used as a novel surface support material. The wall of CNWs consists of several layers of graphene and stands perpendicular to the substrate. CNWs are expected to promote an ionization of a sample due to the localization of electric field by a nanostructure effect or supply of ? electron from graphene edge. We have detected the signal of arginine by using CNWs as a supported material for the SALDI-MS.

Nd: YAG laser (wavelength: 266nm, repetition rate: 30Hz, pulse width: 2ms) was used for the desorption/ionization of the sample. The arginine aqueous solution was produced with mixing the L-arginine hydrochlorides of 10mg and the ultrapure water of 1 ml, and was dropped on the substrates. CNWs were synthesized by using ICP-CVD with methane and argon gases.

Arginine signal was successfully observed in the form of protonated ion $[C_6H_{14}N_4O_3 + H]^+$ at around 175 m/z by using CNWs/Si substrate. In the cases of Si substrate, the arginine signals were not observed. In addition, the signals at m/z of 113 and 115 are observed and are assigned as fragments derived from arginine. From these results, the effect of laser desorption / ionization using CNWs for amino acid was obtained.

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