3D MOMENTUM IMAGING OF LASER DESORPTION IONIZATION OF 2,5-DIHYDROXYBENZOIC ACID (DHB)

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Matrix-assisted laser desorption ionization (MALDI) is a widely used mass spectrometric technique for the mass analysis of biomolecular compounds. For over three decades since its development a considerable effort has been devoted to increasing the mass resolution and efficiency of MALDI. However, due to a lack of a detailed description of the fundamental processes, underlying the initial ionization, leaves optimization of the method at a trial-and-error endeavor. Generally, MALDI exploits a laser pulse to commence an ionization event where ions, neutrals, and electrons are ejected from the substrate surface into the gas phase (plume). Here we used 3D momentum imaging of laser desorption ionization to investigate the ionization dynamics of dihydroxybenzoic acid (DHB) with different laser pulse durations. Varying the pulse duration between femtoseconds and picoseconds present significantly different dynamics that are reflective of the velocity distributions. These findings suggest that MALDI is not a single molecule process, rather a collective intermolecular phenomenon.