The Fastest (msec.), Most Efficient (100%,varied) ESI/MS Sample Introduction Tool That Can Also Produce Excellent MALDI Crystals.

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ESI and MALDI have various imperfections.

For ESI, electric field lines from the surface of cone jets are inherently dispersive directing most of the sample away from the MS orifice. Furthermore, coulombic interactions of like charged droplets, repel each other limiting reducing LC/ESI sample introduction efficiency.

For MALDI, uL sample volumes take up to a minute to dry producing large crystals that phase separate, yielding poor quality, large crystals, in coffee ring "structures" producing noise and lower than optimal sensitivity. Primitive devices used to "manually" deposit volatile liquids, present an irreproducible sample preparation approach.

In this presentation, I present the physics of charged drops and how they can be pushed and pulled to targets be they mass spectrometers, MALDI plates, human beings or other targets. We also discuss how the droplets can be directed to targets and measured on target arrival.

Next, we discuss applications including a new dispenser used by the US Army to dispense viscous liquid onto test animals and into mass spectrometers. Also, we discuss MALDI, NIST and DART major sensitivity improvement for proteins peptides, synthetic polymers and drugs of abuse using IBF. Finally, we present new data on the analysis of Lanthanide and Actinide where with 100% introduction efficiency for approximately ca. 100 solutions, 6400 determinations were made in one day while maintaining a resolution of ca. 19k on a HR TOF machine which acquired data faster than any introduction technique in the world, literally!

Finally, having demonstrated 2 Hz throughput and studying isotope ratios, we forward that using IBF and today’s MS systems a sample throughput for limited objective analytical protocols could approach ca. 20 to 50 hertz and perhaps more in the future.