10/19/17

Dear NASA Scientist,

Thank you for the opportunity to address NASA scientist regarding our technology Induction Based Fluidics (IBF) in support of life finding chemistry. I have again attached a 10 page pdf about our technology induction based fluidics (IBF). Please forward this note about IBF to the attendees. Please note that IBF can be used for

1. simple nL dispensing per our current classified DOD user's applications (liquids can fly up, down, left, right, etc. from mm to m in ms). Importantly, IBF can dispense (i.e. fly) nanoLiter volumes of even ***viscous*** liquids, non-touch across a distance of up to a meter, to animate and inanimate targets of many types, and

2. for nL deposition for MALDI, SIMS and LDI typically yielding a major (>10x increase in sensitivity) as compared to uL depositions, because the crystals are smaller and hence higher yielding (and for other applications like crystallography,) and

3. for very rapid (ms) ESI infusion per DOE applications measuring Lanthanides and Actinide chelates in the field by INL for the last three years, and now for the NEW 100% input efficient UPLC MS per our work with efforts with the University of Cincinnati, just reported at ASMS 2017.

In IBF we use electric induction, to shoot droplets in a straight line like this…….. accelerated at ca. 1 m/s in a directing, not dispersive, electric field. This is unlike conductive electrospray circuits where adjacent coulombic forces repel the like-charged droplets and where the electric field from the ESI cone jet is highly dispersive. This ESI E field dispersion, of course, limits the sample input to ca. 1/1000 or less of the total amount and hence greatly reduces the achievable UPLC MS sensitivity. We can shoot all of the sample into the ESI MS system and that can gain major sensitivity increases, as well.

Please note we can program the inductive energy, timing, wave form and polarity to Gaussian surfaces (e.g., capillaries, syringes, pipettes, chips, pumps) and then to the droplet to realize objectives in one electric embodiment, optionally with Android control, if desired, in the Programmable nL Wave.

Practically speaking, we've used simple, inexpensive capillaries coupled with compression fittings to provide a throw away nL sampler/dispenser typically at or greater than 50 microns id. They've been fed by gravity, syringes, pipettes, syringe pumps or UPLC systems for liquid movement to energized Gaussian surfaces from which the liquids fly, directed to the ESI target or to a MALDI, SIMS or LDI target.

This IBF technology is disruptive, and hence this diatribe. Our many user successes, papers, & our new 100% "ALL IN", UPLC MS data testify to it's potential utility for NASA after our DOD, DOE, NIST, NIH and other successes at Wisconsin (single cell MALDI), Illinois (wall-less kinetics), Cincinnati (100% ESI input of nucleosides), and elsewhere.

I can also say that IBF would probably mate well with NASA's and USRA's LCMS prototype as given in their 2016 ASMS poster and discussions that I have had with A. Southard where the exciting separations of d and l amino acids have been preliminary shown by ESI UPLC MS. I point this out as with IBF, one could have ***BOTH*** an ESI and a MALDI (or LDI) platform on the same mission (with not a whole lot of extra weight presuming some robotics will exist), as IBF can do both.

Questions, please contact me.

Regards,
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