ABOUT, IBF NOW.

We studied ESI by reading over 600 papers over a two year period in the 90's. Then we collaborated with W. Fitch (Affymax), J. Chakel (Agilent), R. Willoughby and E. Scheenan (Chem Space.). Subsequently, Drew Sauter invented and patented Induction Based Fluidics (IBF) with the first provisional submission in 1998 for droplet MS, as applied to MALDI. Prior to this work we had coauthored papers on fundamentals of EI and CI mass spectrometry, and hence the interest and collaboration on ESI.

In 2014-15, the US Army has bought into IBF for a new MS/Dispenser of nerve agents and other analytes for classified work. Also, this year, we've coauthored a Gordon Conference presentation, ASMS posters and with R. Ross and Professor Pat Limbach of the University of Cincinnati, and we coauthored an applied IBF paper regarding the analysis of oligonucleotides, Induction Based Fluidics (IBF) for Droplet-Based Mass Spectrometric Analysis of Oligonucleotides. The paper was just accepted in the Journal of Mass Spectrometry and it shows that they realized major sensitivity increases for the analysis of oligonucleotides, and that practically speaking the technique was robust, an exciting development for these important analytes.

Also this year, Idaho National Lab (INL) has applied IBF to the analysis of Lanthanide and Actinide elements, in the field, using an inexpensive ion trap **WITHOUT** a plasma at fg levels!,(ag?). The same IBF based approach has also been applied to analyze electrolytes from **OPERATING** batteries, by Dr. Groenewold at INL, a new and very exciting development!

Last year, Professor Scheeline and his students published an interesting paper in a January issue of Analytical Chemistry on a pure science application of IBF, as given in this very cool video clip. It shows, a 370nL drop flying into an ultrasonically levitated 3.0 uL drop, shooting the former at ca. 1 m/s in the video which shows the dispense that occurred in 2 ms.

Uniquely, our nanoLiter Cool Wave dispensers and IBF technology, affords major sensitivity and reproducibility increase as given in these references. In fact, it is the **ONLY** device that can dramatically improve BOTH ESI and MALDI, from the same base device or the same IBF technique, optionally allowing for the acquisition of very cool, pure science fluidic applications. Most importantly at its' core IBF is very simple.

Previously, work conducted at Washington U at St Louis, NIH, USF, Wisconsin (Single Cell MALDI), JEOL, NIST, Genentech and elsewhere has shown for MALDI, SIMS, LDI and related techniques that the utilization of nanoliter quantities of sample as compared to microliter sized samples otherwise acquire identically, improved sensitivity by **ca. 10 to 100 X, LITERALLY !** A co-inventor of the QQQ called Gross's published MALDI calibration data shown here, "Astounding!" That stated we find it ironic that many still use what we call the "dumb droplet" method for MALDI. GASP!

Customers, clients of IBF include : U's of Ill (5), WI, CA, Cincinnati, MUSC, Wash. U., USF, USU, US Army APG, ECBC and Natick, Abbott, Biogen Idec, Genentech, Amgen, Hitachi, Allergan, Sciex, Spark, Douglas, NIH, NIST, USDOE INL, Ga Tech, UNH, Duquesne, Merck and others.

In fact, Dr. Bill Davidson, the former Director of R&D at Sciex called IBF, "elegant" and offered to license the technology for LC/MALDI.

ABOUT, BACKGROUND

In the past, as the lead of a number of very talented teams, we proposed and hands-on developed the core GCMS methods for environmental work, from sampling, to sample preparation and handling, to GCMS analysis of VOA's and semi-VOA's. Later we developed the multivariate QC (based on RF's, etc.) and the analysis logistics that have been employed across the specter of USA's environmental GCMS test methods for the last 35 years. These methods, used to measure water purity quality across the USA are derived from ten papers in ten years, along with countless invited and other presentations. This work included nationally implementing FSCC GCMS in three multibillion dollar programs saving literally $B's of dollars, as it increased data quality and for which we received four national awards. It also included a lot of "scut" work including a few hundred pre-contract award, laboratory and other audits from the Love Canal tape audits to those at LANL.

After the MS methods were applied across the USA, we were on the team that took the resulting 20,000 samples and more GCMS data files used to characterize the USA's effluents and rivers for organic compounds, and we built the first national environmental database on DEC systems. This data was used to assess water treatment technologies, and to nationally establish standards. This was very "big data" in the 70's and 80's. As a part of this effort, we published on signal processing (spline function based ion current background correction), pattern recognition and national data base building. We were also among the first to criticize environmental methods, for which we acquired some serious heat, part of which still exists to this date in Nevada and elsewhere. At this time, we proposed LCMSMS based **screening** approach at ASMS in 1983/4. This common sense approach was never adopted, even to this date.

In other areas, we applied MS to the study of OP's, defense and energy characterizations of coal gasification processes, pesticide incineration work, polymer characterizations and industrial process studies in the lab, field, urban environments and at factories. Later, we published 3 out of 4 inter-laboratory GCMS studies. Few have published one.

For example, our analytical chemistry work across the USA allowed us to see the need for improved measurement of radio-chemicals. We subsequently directed federal funding to Dr. Sam Houk, the inventor of ICPMS. Later, we acquired funding for Extrel and Dr. Ross Willoughby for early LCMS R&D whose technology was bought by Waters, that being their entrée into mass spectrometry. We also purchased the first commercially available QQQ sold by Dr. Robert Finnigan, presenting and publishing the first LCMSMS HTS infusion data and LCMS QQQ applications at ASMS and elsewhere in 1983.

Later, during our consulting days, we were hired by seven different branches of the US government as an expert in MS and by most MS manufacturers. This included playing a key role in defeating 20 of the 40 largest firms in the USA in a $B litigation for USDOJ, as we also developed cash flow models and specifications for WMX's $17M lab outside of Chicago. We were the corresponding author of a paper showing how to estimate EI GCMS response factors, and we subsequently spent a significant part of four years developing ways to detect anomalous MS data. That work resulted in winning a $M contract at Los Alamos National Lab, that project being among the first Windows projects in all of USDOE where we developed computer system and approaches that addressed contract, technical reporting, automated data auditing and data integrity assessments for 34 different analytical chemistry technologies.

We have been fortunate to have directed applied and basic R&D and collaborated with some of the best analytical chemist and scientist in the USA and elsewhere including, B. N. Colby, J. Downs, J. Harmon, D. Hunt and J. Shabanowitz, M. L. Gross and T. Tu., G. Groeneowld, W. Shackelford and M. Cline, D. P. Lee, R. Willoughby and E. Sheenan, R. Beimer, D. Betowski, A. Yergey, A. Scheeline, J. Gebhardt, J. Spigarelli, S. Drake/s, T. Brewer, W. Fitch, J. Chakel, P. Limbach and many others. This included an effort to re-iterate "The Beer's Law" of Mass Spectrometry after Kiser, et al, with Willoughby and Chakel at ASMS in 2010, given here in the short and long form.

ABOUT IBF and the FUTURE.

America's greatest mass spectroscopist has called IBF, "exciting" and even "great" when he was informed that we shot cells into ESI systems with 100% sample introduction efficiency. With three new patents, and many pending, we have established a strong position for syringe/MS, pipette/MS, chip/MS, pump/MS, LCMS and IMS and other variants.

IBF can morph existing traditional laboratory devices into non-touch, "electric" dispensers (or sample treatment devices) for application across all lab methods. We predict that IBF will change core laboratory practices from TLC to MS, into much more intelligent and GREEN practices by saving precious samples, making work safer as one saves money on expensive chemicals. For example, going from a traditional 1.0 uL analytical sample to a 100 nL sample, one saves 90% of the cost of chemicals to say nothing of precious sample. Moreover, with IBF and the high sensitivity of today's instruments, it is easy.

We are interested in doing business as it is clearly possible to do good science and business concurrently. Hence, we offer devices as well as, licenses and IP including IP assignment deals for international IP. We are also acquiring new MS and other IP that will change laboratories and manufacturing application making such ventures more INTELLIGENT and GREEN, as IBF affords the ability to do many exciting new things.

ABOUT, Drew Sauter, et al.

Drew worked at MRI, Merck, CSC, and the US government in the 70's and 80's. He has consulted with over 200 major organization as an independent consultant. He has worked and is working with industry and governments on four continents. Having invented IBF in a Nevada garage, as President of nanoLiter LLC that he wholly owns, he is seeking investment and strategic partnerships to grow nanoLiter LLC.

Among his most important accomplishments is being on five peer review papers with, Andrew D. Sauter III EE, who developed among other inventions, the new nanoLiter Programmabler Wave. This droplet generator can be applied to MALDI, ESI, LC variants of both techniques, and for crystallography, and other industrial manufacturing applications. The device is cell phone, computer controlled. One can modify the systems energy, timing, form, locale, it's Gaussian surfaces and other variables. One can also write programs in a macro-like language, and the technology can be placed on most robotic systems.

Andrew holds a BS EE from Santa Clara University. Drew holds a BS in chemistry from Duquesne University and he left Marquette University with a 30 credit MS, when his advisor left, as he was simultaneously "called" to work in a boat yard in the Keys.

Ms. Libby Sauter, RN has nothing to do with this venture, but she's had many high line and climbing adventures and she remains Drew's favorite daughter.