# SmallTech Consulting 3-in-One Abstract for April 19 2017 IEEE MEMS Meeting

**SmallTech Consulting – and Views on Some Opportunities in Medical and Environmental Applications**
**Dr. Leslie Field**

*Leslie Field founded and runs SmallTech Consulting. Her consulting work has helped dozens of companies, and her previous R&D work made billion dollar impacts for HP and Chevron. She also serves as a Lecturer at Stanford, earned MS and PhD in EE/MEMS from UC Berkeley, BS and MS in Chem E from MIT, and is an inventor on 52 US patents.*

A Consulting company focused on micro- and nano-technologies has been quietly operating in the Bay Area for over a dozen years. Numbered among its current and past team members are experts in MEMS, Nanotech, Microfluidics, materials, displays and rapid prototyping, as well as IP and startups; and medical and environmental applications.

This short overview will touch on the challenges and rewards of starting and running such a consultancy, and a personal perspective on how such a group can address some of the biggest needs (and therefore hottest opportunities) in environmental and medical applications.

**A Thin Porous Matrix for Display Applications and Beyond**
**Dr. Mateusz Bryning**

*Mateusz Bryning has innovated in nanotechnology, advanced materials, displays, and medical devices. With a Ph.D. in Physics from UPenn, he has been a startup company entrepreneur, has taught University courses in MEMS and Microfluidics, and been a consultant with SmallTech since 2012.*

A paperlike electronic display technology invented by Zikon, Inc. exploits the electrophoretic and dielectrophoretic motion of colored nanodroplets within a reflective porous matrix. The porous matrix is prepared by depositing thin (< 50 μm) layers of an aqueous slurry containing micron-scale particles and polymeric binder onto a substrate, which may be either rigid or flexible. This talk will describe matrix fabrication methods and resulting physical properties, as well as applications of the matrix to electronic displays. The talk will also introduce how the porous matrix can serve as a model system for studies of two-dimensional fluid flow in porous media.

**A High-Temperature, Third-Generation, Micro Thermal Conductivity Detector for Gas Chromatography**
**Dr. Phillip Barth**

*Phil Barth has pioneered new technology for sensors and MEMS from Stanford University, to startup NovaSensor, to central research labs at Hewlett Packard and Agilent Technologies, and most lately into SmallTech Consulting. With 54 US Patents and 39 publications to his credit, he continues to invent and innovate from the nanoscale to the benchtop scale.*

A micro thermal conductivity detector (μTCD) capable of operating above 400 °C for analysis of high carbon-number chains such as stearic acid was developed by the author and others during his time at Agilent Laboratories. This talk will present and overview of gas chromatography and thermal conductivity detectors, the history of μTCD's from the 1970s to the present, and discusses the work published in US Patents 8,907,433 and 8,313,236. To survive a temperature range of -55 °C (shipping and storage) to 500 °C (operating filament temperature), the 3rd-generation μTCD comprises a suspended membrane having multiple layers of plasma silicon nitride in tension and compression, much like the layered structure of Corelle® dinner plates, and encasing a tungsten sensing filament. The device was designed and modeled at Agilent, fabricated in a combined foundry and job shop environment, and packaged and tested at Agilent. As far as the author knows (he's no longer privy to developments at Agilent) it hasn't found its way into an Agilent product.