Chemical and Petroleum Engineering

Albert Folch

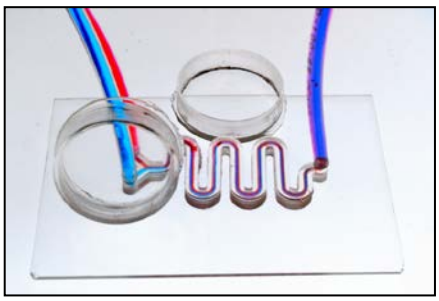
Professor of Bioengineering | University of Washington

Albert Folch received his BSc in physics from the University of Barcelona (UB), Spain, in 1989. In 1994, he received his PhD in surface science and nanotechnology from the UB's Physics Dept. During his PhD he was a visiting scientist from 1990–91at the Lawrence Berkeley Lab working on AFM under Dr. Miquel Salmeron. From 1994–1996, he was a postdoc at MIT developing MEMS under the advice of Martin Schmidt (EECS) and Mark Wrighton (Chemistry). In 1997, he joined the laboratory of Mehmet Toner as a postdoc at Harvard's Center for Engineering in Medicine to apply soft lithographic methods to tissue engineering. He has been at Seattle's UW BioE since June 2000 where he is now a full Professor, accumulating over 6,700 citations (averaging >82 citations/paper over his whole career). His lab works at the interface between microfluidics, cancer and neurobiology. In 2001 he received a NSF Career Award and in 2014 he was elected to the American Institute for Medical and Biological Engineering (AIMBE) College of Fellows (Class of 2015). He serves on the Advisory Board of Lab on a Chip since 2006. Albert Folch is the author of four books, including "Introduction to BioMEMS", a textbook now adopted by more than 77 departments in 17 countries (including 40 universities in the U.S. alone). Since 2007, the lab runs a celebrated outreach art program called BAIT (Bringing Art Into Technology) which has produced seven exhibits, a popular resource gallery of >2,000 free images related to microfluidics and microfabrication, and a YouTube channel that plays microfluidic videos with music which accumulates ~133,000 visits since 2009.

"Digital Manufacturing of Microfluidic Devices"

Abstract

Digital Manufacturing (DM) – of which 3D-Printing is an example – has been applied with great success to improve design efficiency and part performance in the automobile industry, aeronautics, microelectronics, architecture, sportswear, and biomedical implants, among others. However, by comparison with other manufacturing fields, microfluidics has been slow to adopt DM. Microfluidic chips are still designed largely from scratch, the materials (usually thermoset or thermoplastic polymers) are often manually poured into a mold to form 2D-layer replicas, and the mold replicas are manually aligned and bonded to form the final device. The production of microfluidic devices by micromolding, while being optimized for mass manufacturing, cannot be optimized at the same time for design variety. These limitations are difficult for researchers to assimilate because micromolding has been the prevalent mode of microfluidics manufacturing for over two decades. On the other hand, the economics of DM are well-suited for microfluidics because, as opposed to molding approaches, the cost per device does not scale up with its 3D complexity ("complexity is free") and is insensitive to the size of the production batch, i.e. DM is ideal for project customization ("variety is free"). We are developing microfluidic devices through stereolithography (SL), a form of 3D-Printing, in order to make microfluidic technology readily available via the web to biomedical scientists. We have developed microfluidic devices by SL in PEG-DA-based resins with automation and biocompatibility ratings similar to those made with PDMS.



Tuesday, March 13th | 10:00 – 10:50AM | Spahr Auditorium