

Next Generation MEMS Manufacturing

Ten years ago, the Nintendo Wii and the Apple iPhone sparked rapid growth in the MEMS industry by demonstrating the usefulness of MEMS sensors in consumer products. Since then, MEMS motion sensors and microphones have become ubiquitous in smartphones, tablets, laptops, fitness trackers, and other gadgets, with annual production volumes in the billions.

To meet this rapidly growing demand, MEMS makers had to leverage existing high volume CMOS fabs, whether captive in their company or at foundries. At the time, this meant that MEMS sensor designs had to 'play nice' in the traditional CMOS process environment in order to be commercially viable.

The next generation of MEMS sensors emerging for IoT and other large markets, however, will not be as well-behaved. Exciting new sensors such as those for detecting gases, particles, infrared, LIDAR, micro-speakers and others, will need CMOS-unfriendly materials such as piezoelectric thin films and glass. To meet the expected demands of consumer electronics or automotive markets, these sensors will need to be developed and produced in high volume 200mm fabs. Conflict and dilemmas await this next generation: will high volume CMOS fabs make exceptions to their traditional process rules to welcome new technology, or must these new MEMS eventually bow to tradition in order to have a chance at market success?

Dr. Fitzgerald founded A.M. Fitzgerald & Associates, LLC ("AMFitzgerald"), a MEMS and sensors solutions company, in 2003. She has over 20 years of engineering experience in MEMS design, fabrication, and product development, and has personally developed more than a dozen MEMS devices. She now advises clients on the entire technology development cycle, from business and IP strategy, to initial design and prototyping, to foundry transfer and supply chain management. Prior to founding AMFitzgerald, Dr. Fitzgerald worked at the Jet Propulsion Laboratory, Orbital Sciences Corporation, Sigpro, and Sensant Corporation, now part of Siemens. She received her bachelor's and master's degrees from MIT and her doctorate from Stanford University, in Aeronautics and Astronautics. Dr. Fitzgerald has numerous journal publications and holds seven patents. She served on the Governing Council of the MEMS Industry Group (MIG) from 2008-2014 and was inducted into the MIG Hall of Fame in 2013.