

MEMS at Bosch: Products and technology demands

Andrea Urban

Robert Bosch GmbH, Germany


Micro Electro Mechanical Systems (MEMS) at Bosch look back on more than 25 years of development and production. MEMS elements are small mechanical systems, acting either as sensors or as actuators. From the historical point of view MEMS manufacturing technology started based on the established silicon semiconductor process technology. In contrast to semiconductor components, MEMS sensors and actuators are 3-dimensional movable elements. This required the development of additional, new and application specific MEMS manufacturing technologies besides typical semiconductor processes. Nowadays, some of these specific processes are MEMS key manufacturing technologies. Silicon Deep Reactive Ion Etching (DRIE), also known as the “Bosch Process”, is one of the worldwide established MEMS key manufacturing processes on the market. The starting point of this plasma trench etch process for silicon dates back to the development in the early 1990’s at Bosch Corporate Research Center on a prototype equipment. With the “Bosch Process” 3-dimensional structures in silicon can be etched with high etch rates and high aspect ratios at high mask selectivity and without restrictions in crystal orientation. This plasma etch process was an enabler for a large variety of interesting bulk and surface micro machined MEMS products, which nowadays penetrate and support the daily life of all of us. Throughout

the years, a wide base of equipment suppliers for MEMS key manufacturing processes and tools established on the market. MEMS provides low-cost mass products like microphones, micro mirrors, pressure and inertial sensors for automotive, consumer and IoT applications. Autonomous driving or virtual reality as new applications are increasingly pushing inertial sensors performance improvements like higher sensitivity and resolution. A close co-operation between equipment suppliers and MEMS manufacturers helps to improve equipment hardware and processes in parallel to product development, in order to fulfil enhanced MEMS product requirements for the future.

Speaker Biography

Andrea Urban is a senior expert working on the development of new process technologies and their transfer into series production for upcoming generations of MEMS sensors. She completed her diploma in Materials Engineering and Surface Technologies in 1992 at Fachhochschule Aalen, Germany. She joined the Robert Bosch GmbH Corporate Research and Technology Center in Stuttgart, Germany in 1992. She is working as a technology specialist mainly related to inertial sensor manufacturing, which strongly influenced the development and installation of MEMS acceleration sensors and gyroscopes for mass-manufacturing in Bosch’s production line. She is the co-inventor of the “Bosch Deep Reactive Ion Etching Process”. She entrusted with the co-ordination of the European Semiconductor Equipment Assessment I-SPEEDER project, which had a significant impact on the equipment tool basis for advanced Deep Reactive Ion Etching. She joined in 2003 the new founded Engineering Sensor Process Technology division at Robert Bosch GmbH, Reutlingen, Germany.

e: andrea.urban@de.bosch.com

 Notes: