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MEMS

K. Biasio
Marketing Manager
Tronics Microsystems, Marketing, Crolles, France

Biography
For more than 15 years, Karl Biasio has been involved at both technical and business levels in the field of innovative technologies, mainly for listed B2B companies. He holds a Technology University Degree in Physical Measurements from the Université Joseph Fourier of Grenoble, and joined ASM in 2001 as Field Service Engineer, where he installed and sustained epitaxy equipments worldwide for key customers such as Intel, AMD, and Soitec, starting the first 300mm epitaxy tool in the world. After completion of a Master Degree in Marketing from Grenoble Ecole de Management, he moved to Soitec from 2010 to 2014 as Business Intelligence Analyst, in charge of building the global market vision for the company, covering Electronics, Solar and LED activities. Then he held various Sales & Marketing consulting positions for high tech Startups and SMEs, in particular for McPhy Energy, where he structured the IPO strategy deployment at global level. Since 2014, he has been managing Tronics Microsystems' Marketing strategy, addressing the challenges of both the MEMS ecosystem and the financial markets in terms of communication and market positioning.

Gas sensors market and technology trends

C. Troadec
Analyst
Yole Developpement, LYON-VILLEURBANNE, France

Abstract
Air quality is becoming a major concern, and therefore gas sensors are increasingly attracting interest. Gas sensing technologies are not new. Gas sensors embedded in gas detectors for defense and industrial safety applications form a highly regulated and mature market. But the growing awareness of the air quality is creating new applications and opportunities. These include gas sensors in consumer products like home devices, wearables and smartphones, or for buildings and cars, including indoor/in-cabin air quality monitoring.
The consumer market is very attractive as it can drive very large volumes depending on user case adoption, cost and technical maturity. The smartphone industry has revolutionized the sensor industry as mobile applications today aggregate ever more sensors. Gas sensors could be the next to be integrated in smart phones and/or wearables.

For this application, sensors require good sensitivity, reliability, and low cost, small form factor and low power budget. MOS seems to be the best candidate as cost and size fit the requirements for wearables and smartphones. However, as smartphones get more sensors, power consumption is becoming critical and sensors therefore need to be very low power today. Furthermore, MOS sensor sensitivity isn’t very good. Surprisingly, with the latest achievements in size reduction of optical gas sensors based on NDIR, this technology is now challenging MOS technology for consumer applications. NDIR sensors are already used in home products.
In our presentation, we will address the potential applications of gas sensors and benchmark them. We will show the variety of gas sensor applications, each with their own technical requirements, such as the gases to be measured, sensitivity and selectivity, response time, lifetime and power consumption, as well as their own business requirements.
We will review the major players, the new comers with their innovative approaches based on existing MEMS and optical integration platforms.

Biografie
Claire Troadec has been a member of the MEMS manufacturing team at Yole Développement since 2013. She graduated from INSA Rennes in France with an engineering degree in microelectronics and material sciences. She then joined NXP Semiconductors, and worked for 7 years as a CMOS process integration engineer at the IMEC R&D facility. During this time, she oversaw the isolation and performance boost of CMOS technology node devices from 90 nm down to 45 nm. She has authored or co-authored seven US patents and nine international publications in the semiconductor field and before joining Yole Développement managed her own distribution company.

Characterization of MEMS Performance by Optical Measurement – Current Challenges & Recent Developments

H. Steger
Manager Strategic Product Marketing
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Abstract
Optical metrology provides versatile tools for the solution of many measurement and inspection tasks. Applications in many fields benefit from the non-contact nature, the non-destructive working principle, the fast response and from high sensitivity, resolution and accuracy. In the field of MEMS optical measurement can provide a convenient access to both static and dynamic mechanical properties of a device thus providing complementary information to just electrical testing. These measurement data are necessary for the verification of new MEMS prototypes, the validation of FE models, and for MEMS reliability testing. A general technology and application overview with special emphasis on Laser-Doppler-Vibrometry will be concluded with the most recent progress as optical (sub-) pm 3D vibration analysis and ultra-high-frequency vibrometry.

Biografie
Heinrich Steger studied Physics at Bonn University and got a PhD in Molecular Physics from Freiburg University. Since 2003 he is with Polytec GmbH and responsible for Strategic Product Marketing in the Business Unit Optical Measurement Systems.

Strategy to address key MEMS challenges

J.-P. Polizzi
Microsystems Program Manager
CEA Leti, Silicon Component, Grenoble, France

Abstract
With the huge deployment of MEMS sensors in consumer products, this industry has experienced exponential growth in the last decade, but is now facing commoditization of its products. That means market saturation and shrinking margins.

To overcome the "commodization paradox", Yole has identified 3 key factors: innovation, technology platforms and added value through software.

This presentation will show how Leti with its 30 years' experience in the field of MEMS is helping addressing these issues to continue supporting its industrial partners in this highly competitive environment.

Biografie
Jean-Philippe Polizzi holds an engineering degree from French Ecole Nationale Supérieure des Arts et Métiers and a master degree from Clemson University, USA, where he studied fabrication and modeling of micromachined silicon beam components in the frame of his thesis. He has been involved for more than 20 years in the field of microsystem based products developments in different companies. At SAGEM, he participated to micromachined pressure sensors and accelerometers development for the automotive market. He joined Auxitrol in 1997 as the pressure sensor group manager, where he developed a variety of MEMS based aerospace sensors for clients such as Airbus or Boeing. From 2002 to 2004, he was the head of the MEMS group in Thales corporate research centre, where he worked on RF switches and piezo-electric sensors and actuators. He is currently in charge of strategy and business development for the MEMS sensors and actuator activity at CEA Leti.

Infra-red emitters and detectors using a common CMOS MEMS technology platform

S.Z. Ali
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Abstract
Ambient air quality sensors are among the most desirable sensors in the context of smart devices such as phones, watches, accessories and wearable, and could form an important class of devices for well-being and E-health applications as well as remain popular in industrial and automotive applications.
The talk will give an introduction to smart sensor technologies with particular emphasis on gas sensors and Infra-red devices, and will continue with details of Infra-red technology using standard CMOS and MEMS steps. The talk also covers the use of Non-dispersive Infrared systems and their particular use in industrial and consumer applications. Among the targeted gases are CO2, methane as well as CO and H2S.

Biografie
Syed Zeeshan Ali is a Principal Engineer at ams. He completed his Phd in 2007 at the University of Cambridge (UK) on the design of micro-hotplates for smart gas sensors and electro-thermo-mechanical modelling of membrane devices, and was then a research associate at the University of Cambridge researching of micro-hotplates and gas sensing materials. He joined Cambridge CMOS Sensors (UK) in 2010 where he has worked on micro gas sensors, Infra-red emitters and infra-red detectors. Cambridge CMOS Sensors was recently acquired by ams. Dr. Syed Zeeshan Ali has over 50 publications in international conferences and journals. He is an inventor on 4 granted patents and a further 9 patent applications in the field micro-sensors.

E-Thread™: Using MEMS technology for Inserting Electronics in Textile Yarns.

E. ARENE
CEO
PRIMO1D, GRENOBLE, France

Abstract
E-Thread™ is a 3D microelectronic assembly technology that allows for a direct connection between a chip die and external conducting wires, without using the classical leadframe-package scheme. It allows for an extremely dense assembly, so small it can be inserted inside a textile yarn. The current application is using RFID as functional die and work in progress aims at using sensor nodes. The presentation will describe the E-Thread™ technology and its extension to the MEMs and sensor field.

Biografie
Emmanuel Arène has over 25 years of experience in industrialization of innovative technologies and international management. Holder of an engineering degree from Supelec Paris, he has worked for major corporations like IBM Microelectronics, and contributed to the development of Soitec during 15 years as VP Industrial Operations, CEO of the company’s Singapore branch and GM of the solar business unit. He co-founded Primo1D in 2013 and acts as CEO and Chairman of the Board.

Deep Silicon Etch Technology for Advanced MEMS Applications

S. Liu
Managing Director
Advanced Micro-Fabrication Equipment
Incorporation, ICP Technology, Shanghai, China

Abstract
The fast growing IoT industry triggers explosive demand of MEMS devices. Meanwhile the technical requirements become more and more stringent for plasma etch in the fabrication of advanced MEMS sensors. For example, in gyroscope silicon trench etch application, requirement for near perfect vertical profile (tilting angle<0.1□) is needed. Another critical requirement for plasma etch in MEMS application is sidewall roughness control. For example, less than 50nm of sidewall roughness is required in advanced MEMS trench etch. Since callop is formed because of the intrinsic behavior of alternating deposition and etch process in Bosch process, how to eliminate or minimize the scallop has been the major challenge for Bosch process. Bottom notch control at inter-layer is another common issue encountered in high aspect ratio MEMS etch application, when there is a stop layer underneath the silicon film. Bottom notch issue has also been widely studied, and charge up on bottom dielectric layer is the most likely root cause in majority of cases. How to minimize the charge up during plasma etch, while maintaining other process requirement such as profile and etch rate, is the main challenge in Bosch process.
AMEC has developed a new revolutionary plasma etcher, to provide solutions to all technical challenges in MEMS etch applications. The details will be explained in details in may talk.

Biografie
Dr. Shenjian Liu is managing director and deputy general manager of ICP etch technology group in AMEC. He has over 25 years of experience in semiconductor industry, particularly in plasma etch. Before joining AMEC, he had worked in Lam Research, and owned key positions in conductor etch department focusing on process development, productivity solution development and customer technical support.
Dr. Shenjian received his Bachelor Degree from Beijing Institute of Technology in China, and Doctorate Degree in Engineering from Nagoya University in Japan.