MEMS along the Value Chain

A Roadmap for the future inline control and yield management in MEMS production

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Abstract
The International Roadmap for Devices and Systems (IRDS) initiative focuses on maintaining a 15 year roadmap leveraging work of roadmap teams closely aligned with the advancement of the devices and systems industries. Led by an international roadmap committee (IRC), International Focus Teams (IFTs) collaborate in the development of a roadmap to help ensure alignment and consensus across a range of stakeholders. The IRDS roadmap is separated into chapters. Within the chapter of Yield Enhancement the specific requirements on inline control and yield management of MEMS production is described.

New inspection and characterization challenges are generated in the production of MEMS specific technologies, devices and materials. Those cannot be covered with the existing mainstream solutions and need new innovation and solutions.
These new techniques are mainly not yet available on production reliable level. Development of trend-setting methods and furthermore adaption to productive level are necessary.
The roadmap describes all MEMS related requirements like wafer thickness handling, task specific inspection challenges, CD measurement, aspect ratio and material related challenges.

Biography
- **2010 - now Senior Consultant Yield Management,** CONVANIT
- **2005 - 2009, Technical Manager for Yield Enhancement,** Qimonda Dresden
- **2002 - 2005, Project Manager for Defect Density Methodology,** Infineon Technologies Munich
- **1997 - 2001, Manager of Defect Density Group,** Infineon Technologies USA
- **1993 - 1997, Process Engineer Integration,** SMST GmbH Stuttgart
- **1989 - 1993, Process Engineer for Process Control,** IBM GmbH Stuttgart

Master in Physics, 1989, University of Karlsruhe

New technology for inhalers and sprays for a healthier world

W. Nijdam
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Abstract
Medspray is inventor and manufacturer of innovative spray nozzles. Located at 'Kennispark', the business and science park of Twente University in the Netherlands, Medspray uses nano technology to create spray nozzles from silicon with tiny orifices (approximately 2 micrometer in diameter) for a fine nebulization. For reference, a human hair has a diameter of 70 microns.

Medspray is ISO 13485 certified for development and manufacturing of medical devices. The production of spray nozzles is located at Medspray in Enschede, in dedicated ISO 7 clean rooms. World wide partners assemble Medspray's nozzles in mutually developed spray devices. In the summer of 2019 Medspray expects to make its 1 millionth spray nozzle unit, in 2020 we expect to scale further to a production of more than 1 million nozzles per month.

Medspray's mission is based on sustainability. The use of propellants in spray cans for cosmetics and in inhalers can be completely avoided by using Medspray nozzles and simple mechanisms like a plastic pump. Current HFA pMDIs (pressurized metered dose inhalers for e.g. Asthma and COPD) have a similar CO2 exhaust as a car trip of 290 km!

Since the inhaler devices have entered the public domain, our nozzles also have caught the attention of other industries, such as cosmetics. Ap apparently the requirements of a spray for the pharmaceutical industry also apply for the cosmetics industry: long actuation time (multiple seconds), narrow particle size distribution, tuneable spray cone and propellant free operation.
Medspray, tiny technology for a sustainable future.

Biography
Wietze Nijdam is responsible for technology development at Medspray BV, the Netherlands. Medspray develops novel technology for liquid inhalers and spray devices, based on their proprietary micro nano technology spray nozzles. Wietze joined Medspray eleven years ago to industrialize early developments and outsource silicon.Wietze (born in 1970) has a background in silicon processing (M.Sc. Electrical Engineering, University of Twente) with specialization in perforated thin membranes. After graduation Wietze has worked more than 10 years in MEMS on development of filtration membranes and was involved in the start-up of Medspray.

Cutting-edge Plasma Dicing for wafer singulation applied to MEMS devices

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Abstract
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Abstract:

MEMS market trends are demanding dies that are thinner, smaller, and stronger. Conventional line-by-line dicing methods, such as mechanical sawing (“blade dicing”) or laser dicing, are not suitable for fragile MEMS devices, both in terms of economics and reliability.

Plasma Dicing is an alternative method to overcome the many challenges of MEMS wafer singulation that are encountered during conventional line-by-line dicing methods.

Plasma Dicing for MEMS wafers utilizes plasma trench etch (“dry etch”) technology and is damage-free (no chipping, no cracking), offers smoother sidewalls, is particle-free and enables high-throughput. In addition, flexible chip shape design—including round and offset chips is possible.

Plasma Dicing is performed by opening dicing streets on a mask on the wafer surface, and etching where the wafer surface has been exposed. Several masking techniques suitable for MEMS wafers that have been developed by Panasonic can be offered. The throughput of Plasma Dicing depends principally on the thickness of the wafer, and is independent from wafer size, chip size and chip shape. By utilizing Plasma Dicing for MEMS, higher throughput and higher quality than conventional dicing can be achieved. As market trends demand smaller-and-smaller chip sizes—as is typical for MEMS devices—Plasma Dicing offers many benefits when compared to those of conventional line-by-line dicing methods; especially in terms of cost savings and quality increases.

Patented techniques, processes and new equipment developed by Panasonic allow for low cost-of-ownership Plasma Dicing of MEMS wafers, and will be discussed in this paper.

Biography
James completed a degree in Mechanical Engineering from the University of Adelaide in Australia in 2006. Since then he has held various roles in Field-test Engineering, Technical Support Engineering, Project Management & Sales for different companies; mainly in the oil and gas industry. Since 2016 he has been the Business Development Manager for microelectronics at Panasonic Factory Solutions Europe. James' main targets are to establish new business in the European Back-end and Front-end Industry; especially in the field of Plasma Dicing and Dry Etching Equipment, but also Plasma Cleaning, Die-attach and Flip-chip technologies.