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Increased use of chemical process control taking as a path to increased sustainability



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Abstract

As a responsible participant in the modern economy, semiconductor industry shares a burden to Reduce, Reuse and Recycle, as much as possible. Our customers constantly feel this ever-increasing pressure but feel reluctant to fully embrace it. Simply because with it comes sharp need to balance improving process yields and device reliability, while controlling process costs, and optimizing resource utilization. Intense use of chemical materials in the semiconductor process flow is a given and often – aggressive replacement of process chemicals is a safest solution, offered in cases of process variations, unexplained process excursions. This invariably leads to massive amounts of process waste, burden shouldered by our communities and our environment.

This is a perpetual challenge in our industry. So – why have not we solved it and is there a sustainable answer to this problem? We, at NOVA, believe that the answer is increased use of chemical process control. Process control not only allows to reduce natural process variation, improving overall process stability, but in case of chemical process metrology, directly translates to the reduced chemical consumption and optimized chemical lifetimes. With improved process stability and materials optimization, comes possibility to streamline chemical utilization in the fab, while maintaining process complexity, dictated by new integration schemes and material solutions. Electrochemical deposition is a particular sector, where applications at both local interconnect damascene and advanced packaging are intense chemical users, with high refresh rates and often, short bath lifetimes. At both of those instances, implementing unique solutions like DMR (Direct Metal Replenishment) or traditional chemical analyzers enables significant improvement of cost of ownership and reduction in waste generation – a win-win for the customer, environment, and process stability. Outside of the optimizing process chemicals, we believe that implementing more control solution on the incoming materials quality side allows to prevent excursions and process deviations from happening, leading to even more optimized use of resources.

We will discuss several use cases where improved chemical process control by NOVA chemical analyzers shifts the scales sharply in favor of higher process yields, minimizes excursion risks while reducing the environmental impact of the semiconductor process flow.

Biography

Dr. Popova is a physical chemist and material scientist by training. She started her career at IBM Microelectronics Division in NY in 2004, where she successfully worked on developing novel types of lithographic imaging materials and their processing optimization. She has extensive experience in the

semiconductor process integration and technology development side of the business both in the front and back end of the semiconductor manufacturing process. She continued her career by taking a leadership position in IBM's advanced semiconductor packaging division in 2011, with an emphasis on R&D, before joining ancossys in 2013. Here, by engaging the team in multiple strategic collaborations, she has enabled the development of several new platforms and applications for the packaging semiconductor market, strengthening ancossys position as one of the leaders in galvanic bath inline analysis. In 2022, the company joined Nova Ltd as a chemical metrology division, and Dr. Popova now leads as a CTO in developing future applications and methodologies for chemical metrology in multiple sectors and industries.

The Future of Advanced Packaging Inspection is X-Ray



D. van de Ven
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Abstract

Key take aways:

- Semiconductor industry is driven by miniaturization & efficiency
- Next generation X-Ray as valuable inspection method for Advanced packaging
- X-Ray as booster for faster time-to-market & increased yield

In Summary:

X-Ray technology is ready as a valuable inspection solution for Advanced Packaging to reduce time-to-market and increase yield.

Biography

Dionys van de Ven
President Industrial X-Ray Systems

Born 1968, Dutch citizen; Master's degree in mechanical engineering from the Eindhoven University of Technology, Eindhoven

Before joining Comet in 2022, Dionys van de Ven has led Waygate Technologies' x-ray business unit (part of Baker Hughes) as the unit's Business Executive since 2020. In addition, he has been serving as Managing Director of Baker Hughes Digital Solutions GmbH and member of the board of management of GE Inspection Robotics.

Dionys van de Ven began his career at Philips Assembléon in 1997. In 2005 he became Director of Customer Relationship Management at Philips Applied Technologies and, in 2007, Senior Director of Customer Programs, Service and R&D at Philips Healthcare. In 2017, he joined Waygate Technologies.