Fractilia Software Helps EUV Lithography Move Closer to Manufacturing

Feb. 19, 2018 – Austin, TX – Fractilia, the pattern roughness measurement company, has released new capabilities in its MetroLER software to help the semiconductor industry move EUV lithography towards high volume manufacturing.

As EUV lithography nears manufacturing readiness, yield problems due to missing or broken contact holes (a phenomenon called stochastic defects) is causing serious concerns about the viability of the technology. “Pushing EUV lithography to achieve high throughput, and thus low cost, has a side-effect of creating yield-limiting defects, especially at the contact level,” notes Chris Mack, CTO at Fractilia. “The entire industry is working on solutions to this show-stopper problem.”

The first step in solving stochastic defect problems is measuring the severity of the problem. Fractilia’s MetroLER software is the only product capable of accurately measuring roughness, contact hole failures, and other stochastic-related effects.

"Stochastics effects, ranging from micro bridging to contact holes variability and line roughness, are among the most critical issues in EUV lithography today,” said Kurt Ronse, Director Advanced Lithography Program at imec. “In order to properly address these issues, imec believes it is essential to have sophisticated metrology methodologies available, which enable deep understanding and deliver consistent results, not impacted by noisy signals.”

Semiconductor features are not perfectly smooth. Pattern roughness is a type of stochastic effect that describes the amount of variation on the edges of features. In addition to typical metrics of pattern roughness such as Line-Edge Roughness (LER) and Linewidth Roughness (LWR), the industry also needs to accurately measure error distributions and stochastic failure mechanisms such as bridging and missing features, especially for contact holes.

“Accurately measuring stochastic effects is both extremely difficult and extremely important,” said Chris Mack, CTO of Fractilia. “It is difficult because the measurement techniques themselves impact the roughness results, so careful correction of measurement bias is needed before you can trust the measurements. With MetroLER we solve this problem with our patent-pending edge detection systems.” He added, “once we solved this fundamental issue, we were able to then use the entire roughness frequency domain in helping to reduce roughness effects.”

"Line edge roughness characterization can no longer be limited to an average standard deviation number,” said Angélique Raley, Etch Process Development Manager at Tokyo Electron Technology Center of America. “A more in-depth understanding of the roughness along the frequency domain is indispensable to understand roughness propagation from lithography to the etched underlying stacks. Understanding whether the low, mid or high frequency domain is driving the roughness changes throughout the process is key to identifying and addressing the root cause of this change. Tokyo Electron has made roughness characterization in the frequency domain an integral part of their process development to deliver our key customers our best performance."

MetroLER is the first software tool developed exclusively to enable semiconductor engineers to accurately measure scanning electron microscope (SEM) images for pattern roughness and other stochastic effects. The use of MetroLER for solving stochastic problems will be presented by numerous companies at the SPIE Advanced Lithography Symposium starting February 26.

About Fractilia: Fractilia uses computational metrology to help solve pattern roughness problems that plague semiconductor performance and yields at 10nm and below. Its software product, MetroLER™, offers unprecedented accuracy in measuring and analyzing pattern roughness and other stochastic effects and is used by semiconductor manufacturers, equipment manufacturers, resist manufacturers, and research facilities.

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