



- CUSTOMER SUCCESS STORY -

SAMSUNG DISPLAY ASAN-SI, KOREA

Creating and unfolding the future of displays

Display beyond Imagination – the vision and slogan of Samsung Display expresses its commitment to creating innovative LCD and OLED displays for TVs, smartphones, tablets, monitors, and much more. With multiple production sites and research centers around the world, Samsung Display is the world leader in producing OLED and LCD display panels. Displays are made using materials of the highest purity. Their production requires high-performance microwave digestion systems prior to elemental analysis. A solution for Samsung Display was found with laboratory instrumentation from Anton Paar.

Relevant for: Semiconductor industry

Trace impurities – high impact

Samsung Display is the pioneer in the development of LCD and OLED display panels. Their constant innovation over the past 30 years has ensured their position at the forefront of the fascinating world of semiconductors. Samsung Display is the largest producer of OLED and LCD electronic display panels globally with a market share of more than 80 % of OLED displays. Their latest development is the world's first foldable display – a screen that doubles its size and still keeps its high resolution.

The key factor for producing high-quality semiconductors is the control of impurities in the elemental structure of the material, called defects. These irregularities have a high impact on the conductivity and therefore the performance and quality of the semiconductor material. Preventing these defects requires analysis on trace element levels and this requires the most reliable sample preparation to achieve reliable and reproducible results.

Purity is the key at the Samsung Display premises in Asan-si in South Korea. The error-free functioning of their products, mainly displays for mobile devices, relies on the outstanding purity of all components. The whole production and assembly takes place in clean rooms of the highest standards. But not only the production, also the materials themselves need to be immaculate to ensure the perfect display.



Left: Multiwave 7000; Right: Rack 18 with pressure-sealed vials

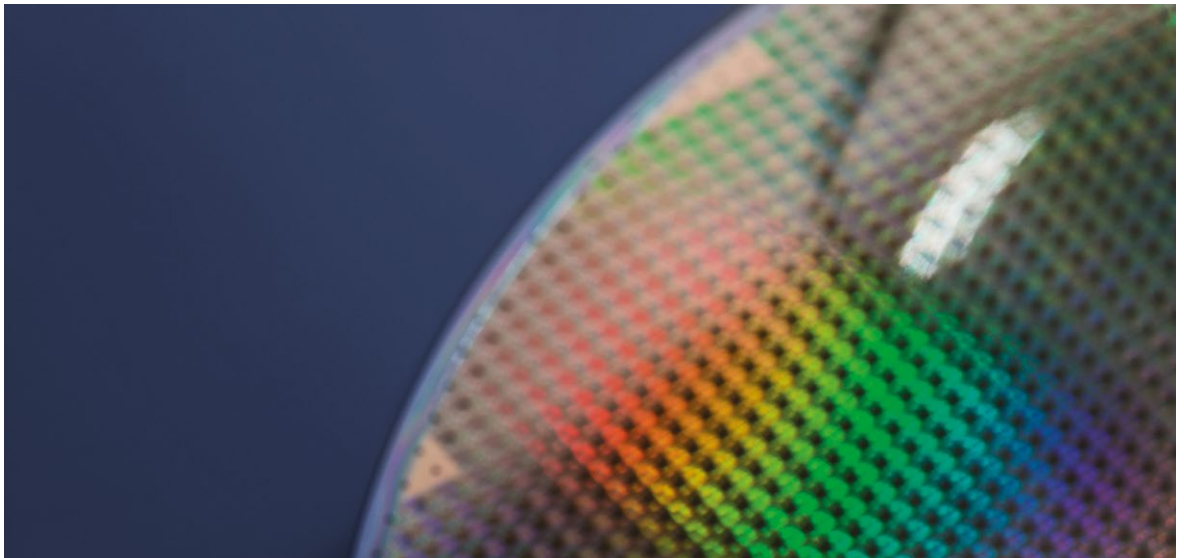
Consistency requires high performance

Samsung Display's analytical laboratory in Asan-si, South Korea, recognized the need for high-quality sample preparation to supply their ICP-MS. Results delivered by trace analysis allow the team to evaluate the causes of defects. This analytical procedure is of the utmost importance and here Samsung Display trusts in the outstanding sample preparation technology by Anton Paar.

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The performance of semiconductors relies on the purity of the material.

The laboratory needs to analyze more than 100 different materials which are used to produce the display panels. The materials are of both organic and inorganic nature and therefore their digestion requires different acid mixtures of nitric acid, hydrochloric acid, hydrogen peroxide, and other acids. Additionally, temperatures well above 250 °C are required to achieve a complete digestion of these samples. The perfect answer for Samsung Display is Anton Paar's Multiwave 7000.

After intensive consultation with Anton Paar Korea, Samsung Display purchased a Multiwave 7000. The team is so happy with the performance of the instrument as well as the support from Anton Paar that they have since ordered a second unit. Samsung Display is now able to quickly analyze their samples and select only the highly pure materials for their innovative work.

Compared to conventional hot plate methods Multiwave 7000 enables sample preparation to be done five times more efficiently. "We can obtain highly reproducible data of trace elements in the ppt-ppb range in our display materials," reports the laboratory manager. "Thanks to the PTFE-TFM vials the lowest blank levels are achieved, which is important for meeting the high requirements for analyzing defects in semiconductor materials. Additionally, the disposable borosilicate glass vials are helpful as we can skip the cleaning step."

Consistent support

“With constant new products and new functions here at Samsung Display, Multiwave 7000 greatly helps to analyze materials more conveniently and accurately. It is very helpful to enhance safety and ease-of-use,” says the lab manager. “Anton Paar also gives a lot of guidance on the devices and technologies.”

While Multiwave 7000 boasts high levels of robustness for the day-to-day work, Anton Paar’s global network of service experts remains just a call away should the need arise.

Where will the technology of electronic devices evolve to in the next 50 years? Which features and devices unthinkable at present will be quite ordinary in the future? We might not be able to predict the answers today, but rest assured that Samsung Display and Anton Paar will be part of creating and unfolding the future.

Main points at a glance

OPERATION: Microwave-assisted acid digestion for trace element detection

SAMPLES: OLED displays, semiconductor materials, dyes

INSTRUMENT: Multiwave 7000

CHALLENGE: More than 100 different materials