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Application Note

Monitoring Dissolved Ozone Concentration in Semiconductor Wet Benches using the 470

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Ozone is a versatile oxidizer and is commonly used in semiconductor wet bench applications for cleaning, particle and photoresist removal. There are several advantages to using ozone in these applications including: reduced use of harmful chemicals such as hydrofluoric acid, minimization of typical chemical waste used in mentioned process, increased cleaning and efficiencies. As the complexity of semiconductor wafer structures increases, the use of ozone will continue to play an important role in the manufacturing processes of those wafers. To fully realize the potential of the advantages, it is important to be able to measure the concentration of ozone present or injected in the process. Therefore an in-line ozone concentration monitor is required for careful control of the amount of dissolved ozone in a liquid.

The Teledyne API (TAPI) 470 Dissolved Ozone Analyzer is a perfect fit for this requirement as it is designed with the demands of the semiconductor market in mind.

Figure 1: Model 470 - Dissolved Ozone Analyzer

In-Line Sensor

The 470 is designed to be an in-line sensor that requires minimal maintenance and can be seamlessly integrated into a wet bench system. In-line monitoring of the concentration of dissolved ozone is the preferred method of measurement over slip stream or side stream monitoring. Slip stream or side stream monitoring requires additional valves, piping and sensors that can fail or create other problems within a wet bench system, such as receiving a concentration measurement that is not representative of the process liquid. With in-line monitoring, you always get a true measurement

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of the concentration of dissolved ozone in the process liquid. The monitor can also be easily spliced into an existing system. Since wet bench ozone included processes require specific levels of ozone, it's extremely important to use an in-line sensor. Figure 2 shows an example of a semiconductor wet bench with an ozone generator and monitors.

Zero Maintenance

Due to its innovative sensing technology, the 470 requires no maintenance to keep the sensor operating at peak performance. Periodic zeroing of the sensor and UV lamp replacements every 2-3 years can be done during regularly scheduled preventative maintenance of the wet bench system. Purge ports are also included to avoid condensation within the area where the electronics are contained to help ensure the sensor operates for the life of the wet bench.

Easy Integration

For integration into a wet bench system, the 470 offers several output methods which can be connected directly to a PLC, PC or integration device. If an analog output is preferred, a 0-5V dc or 4-20 mA output can be selected at the time of purchase. For systems requiring a digital interface, the 470 can communicate via RS232 or RS485. The 470 can also be connected to TAPI's SCI-552 to enhance or create a complete ozone delivery system. Four additional digital status outputs are available including: sensor OK status, invalid reading, lamp low and cell dirty.

With several communication methods, minimal maintenance and in-line design, the 470 is a perfect choice to enhance a wet bench system with all the advantages of dissolved ozone. Remember, ozone can help reduce or omit the use of harmful chemicals, saving time and money required to process and dispose of them. Ozone can also enhance wet bench processes and is much more environmentally friendly compared to sulfuric or hydrofluoric acid. For more information on the 470 and TAPI's complete line of ozone instruments, please contact TAPI Sales at: 858-657-9800 or email us at api-sales@teledyne.com.

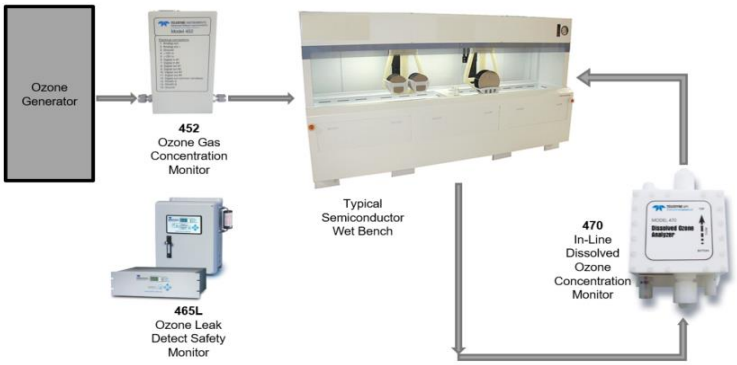

Figure 2: Wet bench system with TAPI ozone instrumentation