
Tokyo Electron, Fujikin, and TMEIC Develop a New Ozone Concentration Monitor for Use with Ozone Gas Generators

– Mercury-Free, Maintenance-Free System Also Saves Power –

Tokyo Electron (TEL™; Head Office: Minato-ku, Tokyo; President: Toshiki Kawai), Fujikin Incorporated (Fujikin; Head Office: Kita-ku, Osaka City, Osaka; President: Hisashi Tanaka), and TMEIC Corporation (TMEIC; Head Office: Chuo-ku, Tokyo; President: Akira Kawaguchi) have announced the development of an innovative monitor for controlling ozone concentration in semiconductor thin film deposition processes. The new monitor will also be fully tested for use (installation) on ozone gas generators.

Background

During semiconductor fabrication, ozone is employed in thin film formation processes to produce a variety of oxide films. It requires keeping a close watch on the condition and performance of the ozone gas generator, which necessitates a reliable ozone concentration monitor. One of the established techniques for measuring ozone concentration is the ultraviolet (UV) absorption method, which leverages ozone's strong absorption of UV wavelengths. A drawback of this method is the conventional use of a mercury lamp as the light source, which contains a hazardous material and needs to be replaced periodically^{*1}.

To address this problem, TEL, Fujikin, and TMEIC have chosen to co-create an ozone concentration monitor and an ozone gas generator that are mercury-free and maintenance-free.

Features and Benefits of the New Ozone Concentration Monitor

1. The newly developed monitor features an LED UV light source to offer high reliability comparable to or surpassing that of conventional monitors.
2. The monitor does not use mercury and therefore is free of environmentally hazardous substances.
3. While mercury lamps of previous monitors had to be replaced every two years, the durable LED light source of the new monitor can be used for 10 years or more with no need for replacement, making the light source maintenance-free.
4. The use of LED reduces the monitor's power consumption from 25 W to 3 W (88% less than that of an existing monitor). The saving is equivalent to a reduction of 77.1 kg of CO₂ emissions (77.1 kg-CO₂e^{*2}) per monitor per year.



New ozone concentration monitor

Environmental Value: Reducing CO₂e Emissions and Running Cost

The newly developed ozone concentration monitor is being used with semiconductor production equipment as well as ozone gas generators. The demand for ozone gas generators is expected to double in the next five years. By using this new monitor instead of conventional ones, CO₂e emissions can be reduced by 310 ton-CO₂e and the lamp replacement cost by about 100 million yen, according to an estimate.

Environmental Technology Co-Creation by the Three Companies

In this environmental technology co-creation initiative, Fujikin and TEL jointly developed the ozone concentration monitor, and TMEIC installed the monitor on its ozone gas generator to test and verify performance, ensuring the monitor is suitable for diverse applications including TEL's semiconductor production equipment and auxiliary facilities.

TMEIC continues to actively promote measures to reduce environmental load toward the realization of a sustainable and resilient society.

*1 The Minamata Convention on Mercury provides control over high pressure mercury vapor lamps for general lighting purposes. UV lamps used in ozone concentration monitors are exempt from this control because they are used for other specific purposes.

*2 CO₂e: Carbon dioxide equivalent

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In order to respond to the needs of manufacturing sites that serve as a foundation for supporting society, TMEIC always sets its eyes on the future of industry, society and the environment as an industrial systems integrator striking a balance between the development of society and a beautiful global environment. TMEIC will contribute to manufacturing and environmental management through leading-edge technologies based on its core technologies of rotating machinery, power electronics and engineering.