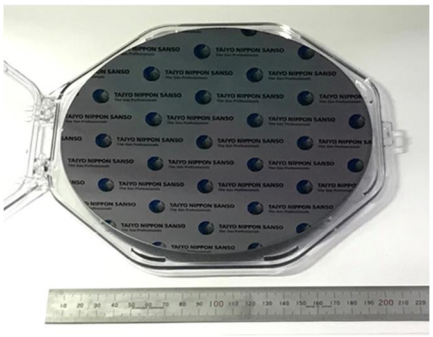
June 30, 2023

Production Efficiency Improved by 2X Compared to Conventional Systems,
Announcement of the Release of the UR26K-CCD for Mass Production GaN MOCVD Systems

Taiyo Nippon Sanso Corporation (president: Kenji Nagata), a Japanese industrial gas company in Nippon Sanso Holdings Group, is proud to announce the release of the UR26K-CCD, the world's most advanced mass production GaN (gallium nitride) MOCVD Systems*. The UR26K-CCD with fully automated handling of wafers and parts cleaning can increase production efficiency by approximately 2X compared to conventional systems. As our flagship production-scale MOCVD model, we believe this newly developed system will meet the emerging needs of our customers. We will continue efforts to augment our MOCVD systems based with proprietary advanced technologies and offer them swiftly in keeping pace with market trends.

*MOCVD Systems:
The equipment for compound semiconductor epitaxial growth while using organic metals and gases as raw materials.

UR26K-CCD Appearance



8 inch Epitaxial Wafer

1. Background

In response to the threat of global climate change, an international trend has emerged to establish a carbon-neutral society. In the semiconductor field, this trend has manifested as a demand to commercialize next-generation power devices capable of offering both improved performance and efficiency. GaN has emerged as a key material in these efforts. Likewise, global competition has stiffened significantly in efforts to develop devices incorporating GaN, such as post-5G technologies, high-frequency devices, and next-generation micro-LEDs.

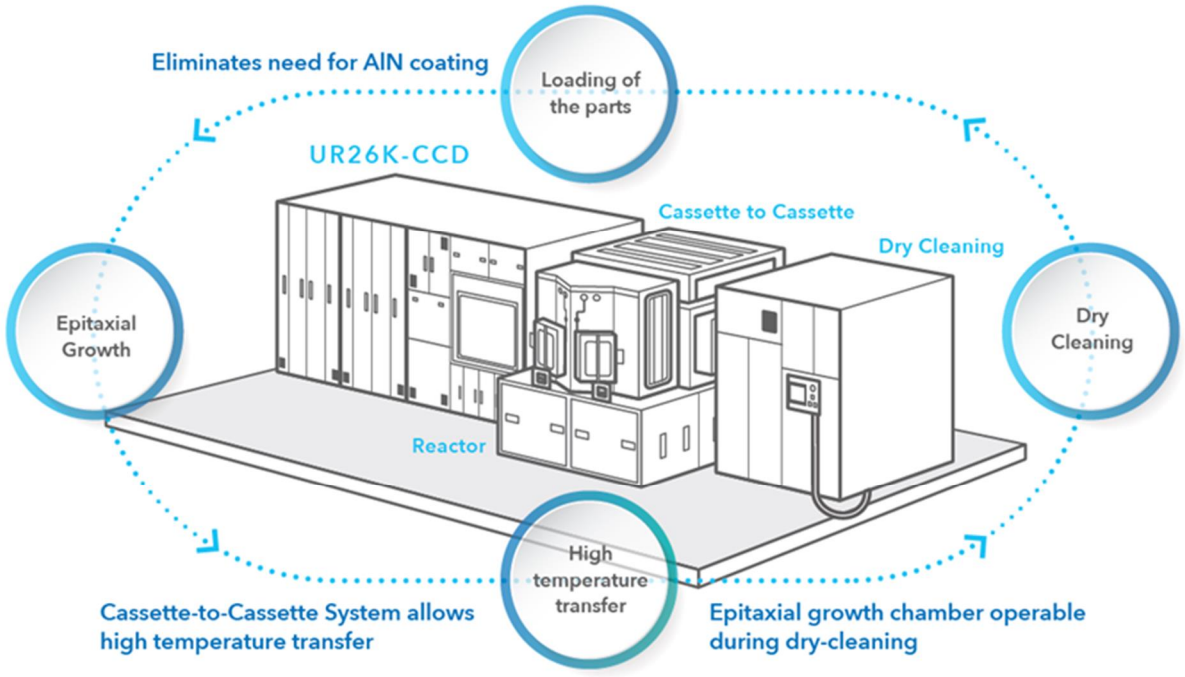
2. Feature and Structure

While Taiyo Nippon Sanso Corporation already offers the UR26K as a commercial production GaN MOCVD system, we now offer the UR26K-CCD, a new, improved model offering an upgraded automated transfer mechanism and an integrated system for dry-cleaning reactor parts to dramatically boost productivity. The two key mechanisms added to the new systems are "Cassette-to-Cassette Wafer Handling System" and "Integrated Dry- Cleaning System".

These features allow fully automated transfer of wafers inside the unit. Additionally, since the used parts inside the reactor are transferred within the system by the transfer robot to the separately-installed dry cleaning chamber and returned to the reactor after cleaning, the entire epitaxial growth process is handled with clean parts. This automated cycle eliminates the need to interrupt the operation of the growth chamber for the cleaning process, which increase in production efficiency of approximately 2X compared to conventional system.

Growing GaN on Si wafers can pose significant challenges to achieving reproducible results, a difficulty attributed to the contamination of wafers due to foreign material and wafer warping. Integrating the cleaning unit and maintaining the consistency of the reactor environment should result in improved reproducibility and higher yield ratios—in short, lower total cost of ownership. The reactor configuration is the same as the conventional UR26K, which employs our proprietary three laminar flow horizontal nozzles, gear-driven wafer rotation mechanism, and a 6-zone resistance heater for uniform film growth.

50% Total Run Time Reduction Against Conventional System



＜Specifications＞

・ Model	:	UR26K-CCD
・ Applications	:	Power device, High frequency device, and Micro-LED
・ Wafer Size	:	6” × 10 or 8” × 6
・ Reactor Type	:	Face up, Rotation & Revolution
・ Gas Nozzles	:	Three laminar flow horizontals
・ Heating System	:	6-zone resistance heaters
・ Sources	:	TMGa、TEGa、TMAl、TMIn、NH_3、Cp_2Mg 、SiH_4
・ Growth Pressure	:	13kPa to 100kPa

[Company Overview]
Taiyo Nippon Sanso Corporation
Business description: Manufacture and sale of various industrial gases such as oxygen, nitrogen, and argon, LP gas, gas for medical uses, and specialty gases, manufacture and sale of welding equipment and materials, gas-related devices, and, air separation equipment, assembly, processing, inspection of electrical components, and equipment maintenance
Established: October 30, 1910
Incorporated: February 4, 2020
Capital: 1.5 billion yen
Shareholder: Nippon Sanso Holdings Corporation (Investment ratio: 100%)
Revenue: 420.4 billion yen*
*Note: This figure shows the revenue of Japan for Nippon Sanso Holdings Corporation in FYE2023

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