CHEMICAL VAPOR DEPOSITION

Enhancing CVD Tools with Advanced Sealing Solutions

In the semiconductor manufacturing industry, Chemical Vapor Deposition (CVD) tools are essential for depositing thin films on semiconductor wafers. These tools must operate under high temperatures and aggressive chemical environments to produce quality semiconductor layers. A CVD tool Original Equipment Manufacturer (OEM) faced a unique challenge when a customer required a process chamber capable of withstanding temperatures up to 400°C and effectively sealing against aggressive plasma.

CHALLENGE

The OEM's existing CVD tools utilized Perfluorinated elastomer (FFKM) seals, which were inadequate for the task. These seals failed at temperatures above 350°C, leading to leaks, particle contamination, and potentially wafer scrap. The OEM needed a sealing solution that could not only withstand higher temperatures but also maintain integrity in an aggressive plasma environment, ensuring the reliability and efficiency of the semiconductor manufacturing process.

SOLUTION

The OEM collaborated with Parker, a leader in advanced sealing solutions, to address this critical challenge. Parker proposed the use of metal seals, renowned for their resilience in extreme conditions. These seals offered several key advantages:

- **High-Temperature Operation:** Capable of functioning at temperatures above 800°C, far exceeding the customer's requirement of 400°C.
- **Superior Permeability Performance:** Ensured minimal leakage and contamination, crucial for maintaining the purity of semiconductor wafers.
- **Material and Plating Options:** A variety of choices to withstand the harsh chemical environments of CVD processes.

Working closely with the OEM, Parker's engineers slightly modified the tool's hardware design to accommodate the metal seal. This collaboration resulted in a seal that could effectively operate at the required temperatures and within the challenging plasma chemistry.

CUSTOMER VALUE

The implementation of Parker's metal seals was a resounding success. The CVD tool now reliably operated at the customer's demanded temperatures without leaks or contamination, significantly improving the quality of the semiconductor wafers produced. This solution not only enhanced the operational efficiency of the CVD tool but also extended the lifespan of the process chamber—reducing maintenance costs and downtime.

Following this achievement, the OEM has adopted Parker's metal seals as the standard for high-temperature sealing in their CVD tools. This partnership not only resolved an immediate issue but also set a new benchmark in CVD tool design and functionality, showcasing the potential of metal seals in overcoming some of the semiconductor industry's most challenging manufacturing conditions.

Parker Hannifin Corporation
6035 Parkland Blvd.
Cleveland, Ohio 44124
1-800-272-7537

www.parker.com