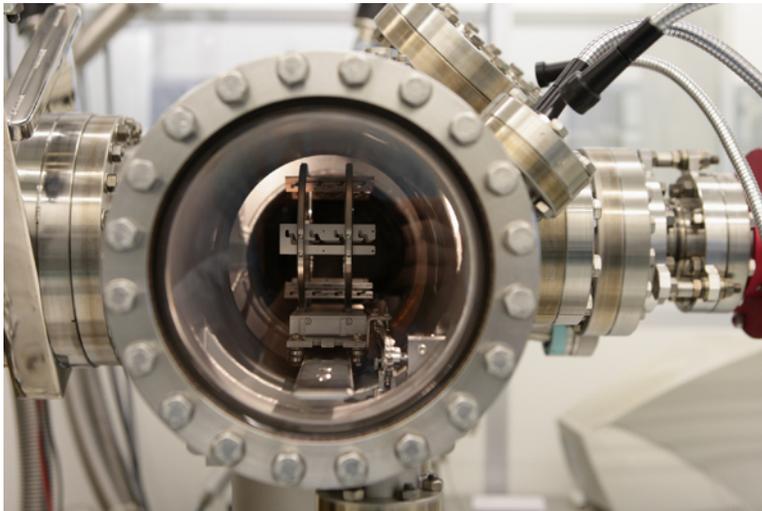


SUCCESS STORY 75

Temperature Measurement During Epitaxial Deposition



Q

How do you monitor the temperature of a silicon wafer accurately without background temperature affecting the measurement?

A

Situation and background

Many processes involve heating methods which can affect temperature measurement. From a product and application standpoint, these interferences need to be eliminated. An example of this is in the case of Epitaxial reactor vessels, which operate in a vacuum when applying deposition layers to silicon substrates. During the deposition process, the wafer sits on a susceptor heated with tungsten sources that are encapsulated with a quartz envelope within the vessel. An infrared thermometer is used to monitor the wafer temperature and control the heaters. In this process, the customer uses the infrared thermometer mounted outside of the vessel looking through a quartz window at the wafer. This measures product temperature without the influence of background radiation from the heat sources within the vessel.

The winning solution

- The Raytek® MMP3H sensor measures a 3.4 μm wavelength. At this wavelength, the sensor is able to look through the quartz window and measure the temperature of the silicon wafer without emissions from heat sources affecting the reading.
- For this customer's application, the unit was configured with VF1 optics. The unit can also be used with CF1, SF1, SF2, SF3 optics, depending on the application, providing small measurement spot sizes.

Savings made

- Using VF1 optics allows the customer to limit spare sensor variations due to flexibility of focusable lenses.
- Infrared temperature measurement is the only solution for this application. Without IR, the customer would not be able to process

KEY FACTS

Industry
Semiconductor

Customer's End Product
Silicon wafers

Process Temperatures
300-1300°C/572-2372°F

Distance to Object
VF1 optics (400mm to 1050mm/15.7" to 41.3" mounting distance)

PRODUCT AND BENEFITS

MMP3H Special high-temperature 3.43 μm pyrometer



- Response time: 150ms (at 95%)
- Temperature range: 300-1300°C (572-2372°F)
- Optics: D/100 (100:1)
- Focusing: Variable Focus from 200mm to 2200mm
- Sighting: Built-in video sighting plus through-the-lens sighting

wafers.

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