

Improved Semiconductor Wafer Cleaning by Using Dissolved Gas Control with Megasonics and Reducing Chemical Usage

New processes for wet cleaning semiconductor surfaces have recently been developed. The new cleaning processes are designed to be more environmentally friendly and reduce the volume of chemicals used.

One such process⁽¹⁾ has been developed in Japan by Professor Ohmi and his researchers at Tohoku University. This cleaning process uses dissolved gasses and megasonic irradiation to remove particles, metals and organics from the surface of semiconductors.



Water Treatment system using Liqui-Cel® Contactors at Tohoku University

This process requires high purity water with dissolved hydrogen gas. One key element in this process is controlling the amount of hydrogen gas that is dissolved into the water. Depending on the process, the amount of hydrogen gas dissolved into the water varies.



Tohoku University in Japan

For this cleaning process, a minimum of 0.6 ppm of hydrogen dissolved into water is required.

Membrane Contactors are used because of their ability to dissolve the hydrogen gas into the water on a molecular level without forming bubbles. Bubbling the gas into the water is not practical due to the difficulty in controlling the gas level. Bubbling also creates unwanted gas bubbles in the water supplied to the system. Bubbles are known to negatively impact the cleaning efficiency of the process.

Membrane Contactors are widely used to remove dissolved oxygen from high purity water. These same Membrane Contactors are also suitable for dissolving gas back into high purity water.

Membrane Contactors utilize hydrophobic membranes that allow a gas and a liquid to come into contact with one another for the purpose of dissolving gasses into water or removing dissolved gasses from water.

By controlling the pressure of hydrogen gas in contact with the water, the amount of hydrogen that is dissolved into the water can be precisely controlled.

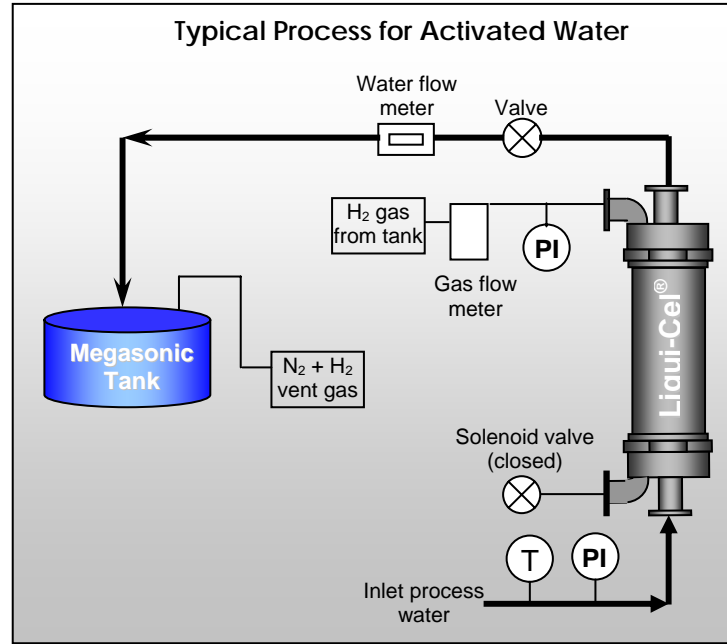
Illustration 1 shows test data from a Membrane Contactor.

The curve shows the amount of

hydrogen that can be dissolved into water under various gas pressures.

Illustration 2 shows a typical process set-up where a Liqui-Cel® Membrane Contactor is used to dissolve Hydrogen into the water feeding a megasonic tank.

For additional information, please contact your Membrana representative or visit us on line at www.liqui-cel.com



Footnote

1. Dissolved-Gas Controlled Ultrapure Water Production System for Wet Cleaning Processes, Morita et al, The Seventh International Symposium on Semiconductor Manufacturing

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