



FOR IMMEDIATE RELEASE

**RASIRC Releases Next Generation RainMaker Humidification System for Fine Water Vapor Delivery**

RHS Solves ALD delivery problems by eliminating particles and microdroplets at very high or very low flow rates

San Diego, Calif – July 15, 2017–RASIRC today announced the release of the next generation RainMaker® Humidification System (RHS). The system incorporates a new control system that provides highly accurate, droplet free water vapor for advanced atomic layer deposition (ALD) processes. The RHS has a wide mass delivery range of 50 - 5100 mg/min water mass flow rate in carrier gases. The system is capable of highly accurate and precise delivery of gaseous water into pressures from atmosphere to high vacuum.

“As demands for film quality and uniformity in ALD/ALE processes become increasingly challenging, process engineers have reached the limits with bubbler delivery methods,” said Jeffrey Spiegelman, President and Founder of RASIRC. “The RHS solves problems associated with process control and microdroplet formation, leading to better film uniformity and fewer defects.”

The system incorporates a patented membrane process that removes atmospheric gases and metal contaminants, and prevents water micro-droplets from entering a carrier gas stream. This removes the need for degassing DI water before use as a process chemical. The RHS provides a steady, reliable flow of ultra-pure water vapor, ensuring that carrier gases are accurately humidified, droplet free and are not affected by sub-atmospheric pulsing conditions used in ALD. Additional processes that can benefit from the RHS include atomic layer etching (ALE), thermal oxidation, rapid thermal processing

(RTP), plasma stripping of photoresists and hard-masks. Previously published studies proved that the RHS could deliver water vapor without particles down to 10nm resolution while alternative methods created up to 5000 particles per second. The RHS was unaffected by carrier gas flow interruptions which was not the case with flash vaporizers. The RHS generation method not only eliminates particles and related spotting, but enables delivery of the vapor at much lower temperatures.

The RHS is an integrated water vapor delivery system featuring adaptive closed loop control. Process parameters are set through automated process recipes or the controller touchscreen. Internal pressure, flow and temperature sensors provide feedback to the control system, which automatically adjusts operations to maintain required temperature and concentration stability.

A non-porous membrane excludes particles, micro-droplets and volatile gases from being transferred to the carrier gas and ensures only water vapor is added. The membrane is water selective. RASIRC patent #7,618,027 is used in the RHS to control the purification and transfer of water vapor directly into a carrier gas stream including inert, corrosive, and flammable gases, such as hydrogen, at a wide range of flow rates for use in solar, microelectronics, and other critical process applications.

## **About RASIRC**

RASIRC specializes in products that generate and deliver gas to fabrication processes. Each unit is a dynamic gas plant in a box—converting common liquid chemistries into safe and reliable gas flow for most processes. First to generate ultra-high purity (UHP) steam from de-ionized water, RASIRC technology can now also deliver hydrogen peroxide gas and hydrazine gas in controlled, repeatable concentrations. RASIRC gas delivery systems, humidifiers, and closed loop humidification systems are critical for many applications in semiconductor, photovoltaic, pharmaceutical, medical, biological, fuel cell, and power industries. Call 858-259-1220, email [info@rasirc.com](mailto:info@rasirc.com) or visit <http://www.rasirc.com>.

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