



FOR IMMEDIATE RELEASE

RASIRC Study Finds 500 Fold Particle Reduction Using RASIRC RHS versus Flash Vaporizer

Low particle count pivotal to processing nanoscale features in new semiconductor devices

San Diego, Calif – June 7, 2016 –RASIRC today announced that a new study shows that the RASIRC RainMaker® Humidification System (RHS) generates substantially lower particle count than flash vaporizers. The study compared particle generation in thermal and membrane evaporation systems using water. Particles are hazardous to microelectronics, causing defects and reduced electrical performance. Shrinking device sizes have made even the smallest particles and microdroplets into killer particles. The RASIRC RHS generates and delivers precise amounts of ultrapure water vapor for atomic layer deposition (ALD) and other semiconductor processes.

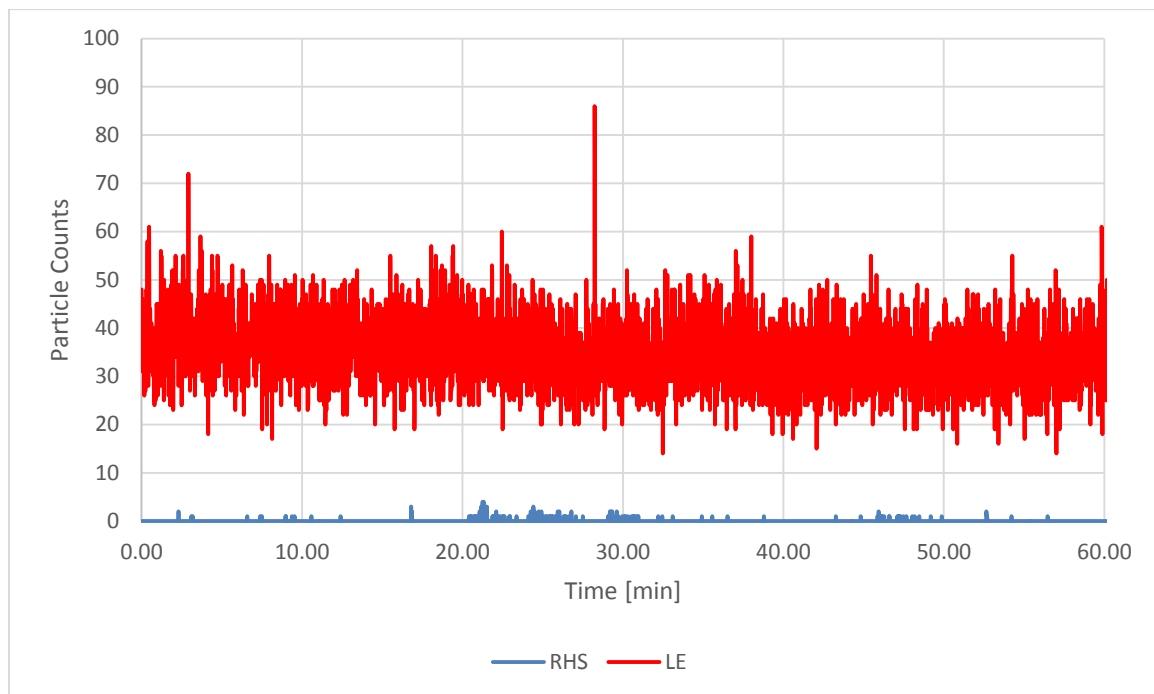
“Particle problems frequently arise when vaporizers are used to create gases from liquid sources,” said Jeff Spiegelman, RASIRC President and Founder. “Our pervaporization technology keeps liquid and gas separate by using a non-porous membrane. This technology demonstrates a particle-free vapor instead of a constant stream of particles that is generated with current vaporizer technology.”

The study compared the relative particle/microdroplet generation of pervaporation versus flash vaporization in both continuous and intermittent flow conditions. A liquid evaporation vaporizer (LE), also known as a flash vaporizer, was compared to the RHS. Particles down to 10 nanometer size were measured by a condensation particle counter using water vapor as the condensation gas.

Results in continuous flow testing showed that the RHS was substantially more effective than the LE. The LE created 400-500 times more particles per minute than the RHS. In intermittent flow conditions, testing showed that the RHS was insensitive to flow interruptions while flash vaporizers created spikes of up to 5,000 on initiation of flow.

“Incomplete vaporization is the fundamental problem for flash vaporizers, causing spikes and a continuous stream of entrained microdroplets,” said Spiegelman. “The RHS operates at lower temperatures and adds water vapor directly to the carrier gas, reducing particle count reaching wafers and thereby improving film uniformity.”

Previous testing indicated that the RHS is feasible for ALD. In that testing, the RHS was able to achieve expected layer thickness and there were no obvious particle difference with a standard ozone plasma process.



Comparison of RHS and LE. LE internal temperature at 140°C. Overall, LE created 400 to 500 times more particles per minute.

For more information, download a copy of the white paper [“Particle Generation by Incomplete Vaporization of Condensable Fluids and Particle Prevention by Membrane Pervaporation.”](#)

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 steam from de-ionized water, RASIRC technology can now also deliver hydrogen peroxide and

hydrazine gases in controlled, repeatable concentrations. RASIRC gas delivery systems, humidifiers, closed loop humidification systems, and steam generators are critical for many applications in semiconductor, photovoltaic, pharmaceutical, medical, biological, fuel cell, and power industries. Call +1(858)259-1220, email info@rasirc.com or visit <http://www.rasirc.com>.

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