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Poster available at

http://www.rasirc.com/resources/whitepapers/whitepaper_PVSEC_2011_Poster.pdf

RASIRC Presents Poster on Use of Water Vapor in Atomic Layer Deposition
*Poster compares Ozone to Proprietary Water Vapor Generation and Delivery Technique for
ALD Film Growth*

San Diego, Calif. – September 14, 2011 – [RASIRC®](#), the steam purification company, announced that the company presented a poster on the topic “*Water Vapor Versus Ozone for the Growth of ALD Films*” at the 26th European Photovoltaic Solar Energy Conference and Exhibition held September 5-9, 2011 in Hamburg, Germany. The RASIRC poster presentation describes the advantages of water vapor over ozone in the use of Atomic Layer Deposition (ALD) and provides results from testing that show faster growth rates with water vapor compared to ozone. [RASIRC products](#) deliver ultrapure water vapor for photovoltaics, nanotechnology, semiconductor, and other manufacturing applications.

“Passivation layers are a major component of next generation crystalline solar cell devices. Al₂O₃ films grown through ALD is one technology path,” said Jeff Spiegelman, president and founder of RASIRC. “Our poster shows ALD layers can be grown effectively using water vapor instead of ozone, which is more expensive, equipment intensive, and hazardous. The major limitation to commercial acceptance of ALD is the slow growth rate. The replacement of ozone with the faster growth rate of water vapor is one step towards commercialization.”

The testing, performed by the Fraunhofer Institute in Dresden, Germany ran 100 ALD cycles of trimethyl aluminum (TMA)/Water and TMA/Ozone precursors. Water vapor grew at a rate of 10.25 Å/cycle while ozone grew 0.9 Å/cycle. The growth rate was 14% faster with water vapor. The water vapor generated less than 40 particles added in random pattern, typical with this process. A RASIRC [RainMaker® humidification system \(RHS\)](#) was used to generate the ultrapure water vapor.

The patented RASIRC RHS generates and delivers precise amounts of ultrapure water vapor purified for both ionic contaminants and dissolved gases. The RHS adds controlled amounts of

pure water vapor directly into any carrier gas stream. It can humidify inert, corrosive, and flammable gases, such as hydrogen and oxygen, at a wide range of flow rates. The system can deliver into atmosphere as well as vacuum process pressures.

The 26th EU PVSEC highlighted progress in research, technological development, and production processes, bringing together all key specialists of the industry to make it the most informative platform for the global PV Solar sector.

About RASIRC

RASIRC products purify and deliver ultrapure liquids and gases. RASIRC technology is the first to generate ultra-high-purity (UHP) steam from de-ionized water. It reduces cost, increases yield, and improves safety. RASIRC dryers, [humidifiers](#), and [steam generators](#) are of critical importance for many applications in the semiconductor, pharmaceutical, medical, biological, fuel cell, and power industries. Custom systems are available upon request. Call +1-858-259-1220, e-mail info@rasirc.com, or visit www.rasirc.com.

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