# New Sensor to Drastically Cut Water Usage During Chip Making Process

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Semiconductor Research Corporation (SRC), University of Arizona and Arizona State University researchers have shown a new, exclusive way to dramatically conserve the amount of water needed to manufacture semiconductors. Using a unique device called Electro-Chemical Residue Sensor (ECRS), it allows for clean, rinse and dry process optimization that helps make semiconductor facilities more efficient, sustainable and cost-effective.

Water conservation in semiconductor facilities is becoming a major concern for integrated device manufacturers (IDM), as the costs, availability, and sustainability of water resources can greatly affect manufacturing facilities. Approximately 80 percent1 of water consumed by semiconductor sites is used in the rinsing of the wafer during various stages of device fabrication. Additionally, a wafer going through a modern semiconductor process is rinsed roughly 400 times, according to industry experts.

“The use of water resources are getting increasingly more critical especially as the industry moves to smaller features and approaches nano-scale manufacturing technologies,” said Dr. Bert Vermeire, associate professor of research at Arizona State University. “A main reason for high water usage is inadequate process monitoring, which can be attributed to the lack of appropriate monitoring tools. One cannot optimize what one cannot measure.”

ECRS addresses this measurement challenge by dynamically assessing a

wafer's cleanliness during the clean, rinse and dry cycles. A comprehensive simulation model estimates residual impurity concentrations from the measured results. No other sensor of this type is available today.

"Tests performed in collaboration with an IDM's large integrated circuit manufacturing facility demonstrated this sensor's capability to detect chemicals inside features, showing annual water savings of up to 50 percent could be realized by optimizing the rinse process using the ECRS," said Dan Herr, SRC director of Nanomanufacturing Sciences.

The fundamental science for the ECRS was developed at the University of Arizona's Engineering Research Center for Environmentally Benign Semiconductor Manufacturing with support and mentoring from SRC. Environmental Metrology Corporation was spun off from this center in 2003 to commercialize the sensor. A prototype was designed, built and tested under the National Science Foundation's Small Business Innovation Research program. Environmental Metrology Corporation was also awarded a 2009 Editors' Choice Best Product Award from Semiconductor International for the ECRS.

A wireless version of the sensor is being jointly developed by Environmental Metrology Corporation and the ConnectionOne Industry-University Research Center located at Arizona State University.

Source: Semiconductor Research Corporation