

# **A Compact, Real-time, Point-of-Use Metal Ion Concentration Sensor for Liquids**

**Ron Chiarello, Agnieszka Jakubowicz, C. Eric Boyd, Christopher Wacinski  
and Douglas Fraser**

Jetalon Solutions, Inc.  
Campbell, CA

## **Abstract**

The increasing use of metals, such as copper and cobalt, in semiconductor manufacturing processes has led to a need for measuring metal ion concentrations in processes and in effluent streams. For example, trace amounts of metals are found in plating process rinse streams, copper-CMP (chemical-mechanical planarization) waste water and other semiconductor fabrication operations. It follows that a point-of use (PoU), real-time, cost-effective metal ion concentration sensor has applications for process monitoring and control, to monitor metal concentrations in effluent streams, and as an environmental compliance monitoring system. In this paper, a compact, real-time and in-line optical sensor for the detection of metal ions in liquids is presented. Test results show that  $\text{Cu}^{2+}$  can be measured for concentrations over the range of 50 ppb to greater than 10 ppm with a less than 10 second response time. Results are presented that show the effectiveness of the sensor for measuring  $\text{Cu}^{2+}$  concentrations in the presence of typical waste streams constituents found in semiconductor applications.