

## **SENSORIUM Executive Summary**

SENSORIUM is a new multidisciplinary research center focused on research and development of next generation chemical sensors. It is housed in the University Memphis departments of Biomedical Engineering, Chemistry and Electrical and Computer Engineering and takes advantage of significant expertise among a core group of faculty. The short-term goal of SENSORIUM researchers is to demonstrate the unique properties of nanocapsule-enabled optical-based chemical sensors and to demonstrate the feasibility of integrating this new technology into devices with near-term commercialization opportunities. The longer-term goal is to apply the initial technology to a broad range of specific chemical detection needs of industry and government agencies. These technologies all build on earlier inventions made by individual SENSORIUM researchers and are proprietary to the U of M. A key strength of this new center is the unique collaboration possibilities offered by the industrial partners who have committed to providing technology advice, access to cutting edge instruments and product development review.

According to Freedonia Group (<http://www.reportlinker.com/p090368/Chemical-Sensors-Market-in-the-USA.html>), “US demand for chemical sensors is projected to surpass \$5 billion by 2012. Biosensors will continue to be the largest type of chemical sensor, as the increasing number of diagnosed diabetics continues to boost demand for blood glucose test strips. Overall growth will also be supported by technological advances that allow for price reduction, sensor miniaturization and greater precision, all of which expand the use of chemical sensors into new markets or new applications within existing markets. Demand for chemical sensors, based on emerging technologies such as optical sensors, will see the fastest gains. The biggest market will remain the medical market, but growth will be strong in all chemical sensor outlets, including industrial and environmental applications.”

The same document predicts that “Through 2012, optical sensors and biosensors are expected to provide the best opportunities. Optical sensors -- including infrared sensors and

products based on fiber optic, photoionization, fluorescence, chemiluminescence, light emitting diode, laser and ultraviolet technologies -- will see the fastest gains of all sensor types. Optical sensors will continue to benefit from their high sensitivity, stability, immunity to interference and product improvements such as smaller size and enhanced ruggedness.” Furthermore, the report concludes that “Biosensors will also record rapid advances, boosted by the aging population and growing demand for home and point-of-care testing and monitoring tools, primarily for blood glucose levels. While the development of multianalyte sensors and the use of biosensors in high-density arrays will support demand, biosensors used outside of medical applications will continue to face considerable challenges from other existing detection and measurement methodologies.”

Finally, the report expects that the “medical market will ...not only grow the fastest, but also will continue to represent the largest market for chemical sensors.” “However, competition among suppliers will put downward pressure on prices as manufacturers strive to capture or maintain market share.” In addition, the development of lower-cost, more durable and higher performance chemical sensors will drive demand in automotive cabin air quality applications and other markets such as process industries, environmental monitoring and homeland security.”

The proposed focus areas of research within **SENSORIUM** are perfectly in line with the predicted trends. The strategy is to focus on optical pH sensors in the first year and then expand into ion-selective optical sensors and biosensors based on pH measurements.



**Sensor Institute of the University of Memphis**