Developing The Senses

by Cindy Bruckner-Lea

The feature articles of this issue of *Interface* are devoted to areas of sensor research and development that are emerging and expected to grow in the coming years. Sensor research and development is the focus of the Sensor Division of The Electrochemical Society, and crosscuts most of the other ECS Divisions. For example, batteries are needed for portable sensors, and sensor systems often include dielectric materials, electrodeposited materials, high temperature materials, and luminescent materials. Recent research also has been directed toward the use of new materials such as nanotubes in sensor systems. As highlighted in this issue of *Interface*, sensor systems often include electronic materials (see "Chemical Microsensors"), are used for applications related to energy (see "Electrochemical Sensors for Energy and Transportation"), and can involve topics in biological electrochemistry (see "Biosensor Systems for Homeland Security").

Sensor research and development often encompasses many fields outside the traditional scope of ECS. For example, sensor research includes the development of electrochemical sensors, as well as sensors that operate using other transduction methods such as optical and mass measurement methods. Materials science is also critical for the development of new polymers and inorganic materials for molecular recognition for chemical sensing, and data analysis methods are becoming increasingly important in processing the information from sensor arrays. Due to the wide range of applications for sensors in research, industry, and by consumers, sensor development is often closely integrated with fields such as biology, medicine, aerosol science, and environmental science.

This issue of *Interface* includes three feature articles which highlight growing areas in sensor research and development as well as the interdisciplinary nature of this field. The first article, "Chemical Microsensors,"

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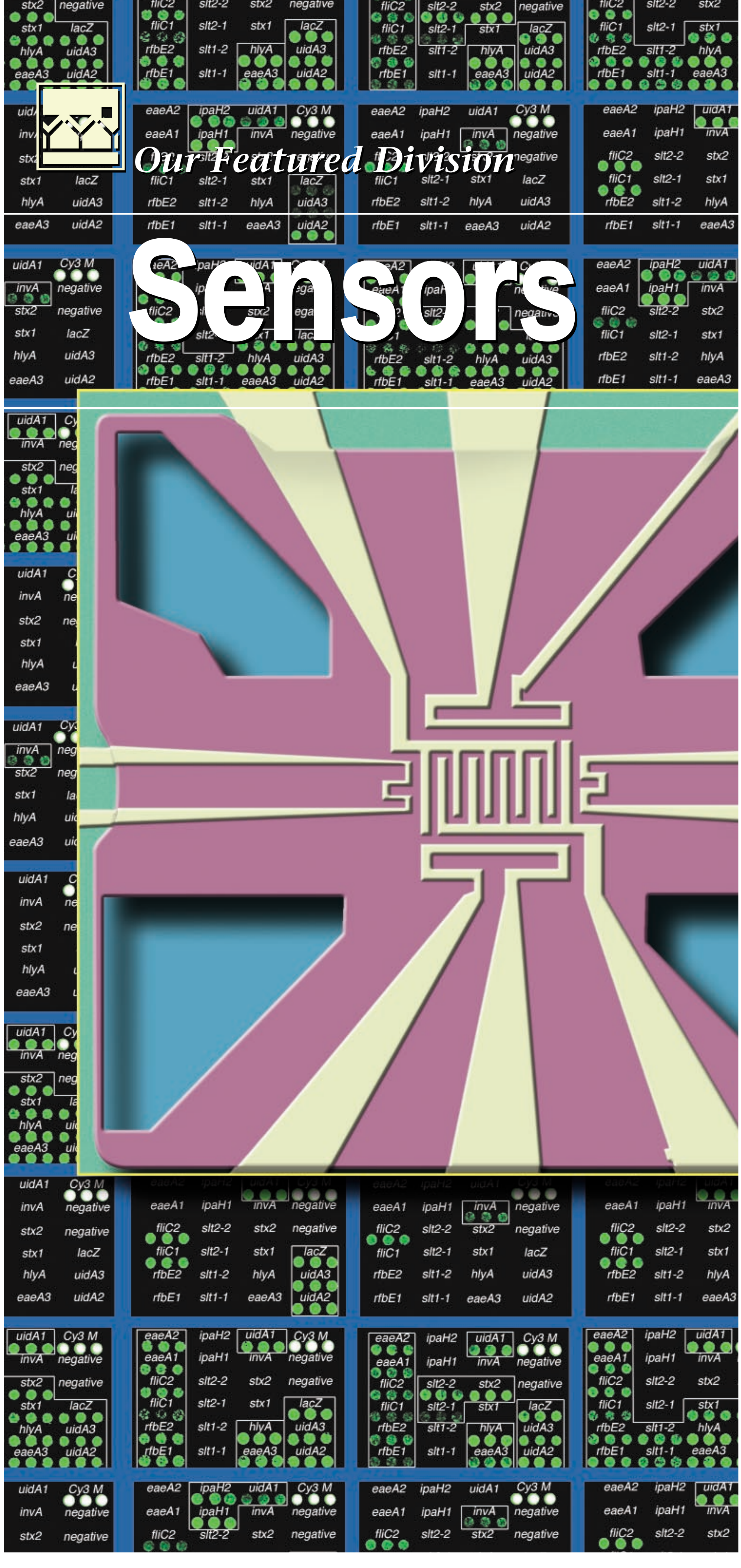

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describes the application of silicon-based processing techniques to create microsensor systems. These chemical microsensor platforms (called micro-electromechanical systems or MEMS) are being developed for a wide range of applications to minimize the size, weight, and power consumption of chemical sensor systems. The second article, "Electrochemical Sensors for Energy and Transportation," describes the application and development of solid-state sensor technologies to monitor combustion processes in the automotive and energy industries. This is a growing area due to the increasingly stringent requirements for minimizing pollution and maximizing combustion efficiency. The third article, "Biosensor Systems for Homeland Security," provides an overview of biosensor systems for pathogen detection, and highlights some challenges for the future development of biosensor systems to aid in minimizing the effects of both naturally occurring pathogens and pathogens intentionally distributed as biological weapons.

In addition to the three feature articles, this issue of *Interface* includes a new type of technical note, a tutorial, which is making its debut here. In contrast to the theme of the feature articles (emerging sensor research areas), the tutorial briefly explains the fundamental operation of the most widely used chemical sensor, the glass electrode. While the glass electrode is widely used for pH measurements, it is often taken for granted and not commonly understood.

On behalf of the Sensor Division, I hope that you learn from and enjoy the feature articles and the tutorial. These articles illustrate the breadth of sensor research and development, and the utility of sensor systems for a range of industry, government, and consumer uses. ■