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Editorial

Celebrating Our Editorial Advisory Board

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In this Virtual Issue, *ACS Sensors* celebrates the contributions of selected past or present members of our Editorial Advisory Board, who have been instrumental in advancing the field of sensor science and in the success of *ACS Sensors*. These 30 papers were selected by the editorial team based on their originality and potential for impact. They represent key advances in sensitivity, specificity, fidelity, or reliability of sensors—some in the collection attack practical barriers encountered with a specific sensor application, while others focus on fundamental problems underlying a whole class of sensors. Collectively, the authors in this Virtual Issue demonstrate the broad diversity of scientific and engineering themes that are currently driving the field.

A sensor is often broken into two parts: a recognition element and a signal transduction element. Each of these parts brings its own set of challenges, and the articles featured in this Virtual Issue highlight many of them. The recognition element answers the question "is it there?" and it generally takes the form of a molecule that has a very specific affinity for the analyte or species we are trying to sense. Aptamers, currently a popular class of recognition elements, are used by several of the papers in this issue (Andrews, Bäumner, Goldys, Lammertyn, Lim, Plaxco). Engineered from nucleic acids, aptamers can capture their target analyte with high specificity, offering an interesting alternative to the more conventional antibody−antigen paradigm. Another approach is to engineer the recognition element from a protein other than an antibody; Anand provides an excellent example of this by engineering a set of pollutant sensing domains for benzene and its derivatives from a phenol regulator protein derived from a soil bacterium.

Less specific and less conventional forms of recognition are also represented in the collection—some discriminate more broadly, such as hydrophobic/hydrophilic coatings (Boisen, Rusling) or ionic liquids (Swager), and others are more specific, triggering on distinctive energy or charge transfer pathways (Potyrailo, Tang) or vibrational modes (Boisen, Mizaikoff). An emerging theme with many of these less specific modalities is to couple two or more orthogonal techniques together to improve fidelity of detection; for example, Mizaikoff combines waveguide vibrational spectroscopy with a metal oxide conductivity sensor to provide an elegant demonstration of this concept applied to gas phase analytes, and Hierlemann, Kalantar-Zade, and Nagai give examples of how multimodal sensors can enhance detection in various biological fluids.

The transducer, being the physical process that allows the sensor to tell the outside world that it has detected the target analyte, is a critical contributor to the ultimate sensitivity of the device and it answers the question "how much is there?" The papers that were selected for this Virtual Issue highlight the very broad range of optical, mechanical, electronic, or electrochemical processes available to the community today.

Even with exquisitely designed recognition and transduction elements, sometimes the sensor needs help when there is a lot of "clutter" in the analyte matrix—for example, high levels of albumin or nitric oxide in a serum sample or water vapor or engine exhaust fumes in an air sample often interfere with recognition, and so clever design is needed to provide a means to reject this clutter. Several interesting approaches to clutter rejection are represented in this collection, taking the form of chemistries that block or inhibit interferents (Meyerhoff, Venton, Yang), materials that concentrate the analyte (Chen, Giessen, Li, Prins, Segal, Strano, Szunerits) or catalytic systems that increase the effective analyte concentration (Ma, Rotello, Stevens, Wang).

This issue demonstrates the tremendous contributions that members of the Editorial Advisory Board have made to our field; I hope that it also conveys the immense gratitude that *ACS Sensors* has for their continued support of the Journal.

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Notes

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