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Virtual Issue: Molecular Sensors**

Ramón Martínez-Máñez*[a]

This virtual issue in ChemistryOpen on "Molecular Sensors" highlights current research in the area of chemosensing and how wise designs can lead to selective sensing of target analytes.

A molecular sensor, also known as a chemosensor or probe, is a molecular or supramolecular-based system that is able to transform probe–analyte interactions into a signal which allows analyte sensing. The most common output signals are usually optical or electrochemical changes. In particular, optical responses have become very popular due to the possibility of using low-cost, widely available instrumentation and even the possibility of detecting target species with the naked eye. The design of these molecular sensors and probes has advanced and gained importance in the last years due to the progress made in the knowledge on the preparation of host–guest complexes and on studies on how this interaction can be used for the design of selective molecular probes. This is a very interdisciplinary filed that in many cases involves organic or inorganic synthesis, photo-physical studies, and analytical applications. In this context, the design of new molecular sensors to detect anions, cations, and neutral species has gained primary significance recently due to the importance to detect target analytes in environmental and biological samples. Molecular sensors for metal cations were developed more than two decades ago, whereas probes for anions and neutral species have been investigated more recently.

Articles already accepted show diverse approaches for the design of chemical probes that are based on different sensing principles and display sensing features to a wide range of analytes such as anions, cations, neutral molecules, and gases. Molina et al. (DOI: 10.1002/open.201402022) prepared aryl or heteroaryl 5-substituted imidazo-benzothiadiazole derivatives and found an interesting selective dual-channel sensing of mercury(II) cations and acetate anions. Moreover the probes also display sensing features in the presence of nitroaromatic compounds with a selective response to the explosive picric acid. In a close research approach to the design of sensing probes for target chemical substances that could be used as weapons, Martínez-Máñez, Costero, and co-workers (DOI: 10.1002/open.201402014) designed a molecular sensor for the selective chromogenic recognition of diisopropylfluorophosphate (DFP), a Sarin and Soman mimic, in 99:1 (*v*/*v*) water/acetonitrile and in the gas phase. Anion sensing probes were studied in the works of Ito et al. and Yam and co-workers. Ito and Shinoda (DOI: 10.1002/open.201402049) prepared macrotricyclic octadentate cyclen dimer ligands that were able to afford cage-shaped dinuclear Na^+ complexes. The authors found an interesting selectivity for dicarboxylates of different length. For instance, N-Boc-Asp dianion was strongly coordinated inside the cavity of the receptor whereas N-Boc-Glu dianion, which was one carbon longer, did not. On the other hand Yam et al. (DOI: 10.1002/open.201402019) designed probes using alkynylplatinum(II) terpyridine complexes with an amide-based receptor moiety and studied their sensing features in the presence of different spherical and non-spherical anions. As an example of molecular sensors for cations Lodeiro and co-workers (DOI: 10.1002/open.201402020) prepared a probe based in a bipyridyl unit that was covalently anchored to a rhodamine B fluorophore and studied the interaction of this molecular sensor with Cu^{2+}, Zn^{2+}, Cd^{2+}, Hg^{+}, and Hg^{2+}. Different sensing responses were found to mimic certain logic operations. Finally, two works from Liz-Marzán and Pérez-Prieto described the use of inorganic supports for the design of probes. Liz-Marzán and co-workers (DOI: 10.1002/open.201402009) developed a simple procedure to prepare three-dimensional surface-enhanced Raman scattering (SERS) detection substrates and used these structures for the detection of malachite green in water and of 1-naphthalenethiol from the gas phase. Moreover Pérez-Prieto and co-workers (DOI: 10.1002/open.201402021) used CdSe/ZnS nanoparticles that were decorated with pyrene units as a sensing platform. The authors showed that the probe could be applied as a ratiometric oxygen sensor in organic solvents.

In summary, this virtual issue in *ChemistryOpen* on "Molecular Sensors" includes nice examples in this highly interdisciplinary research field. Overall, the contributions beautifully illustrate current research in the area of chemosensing and how wise designs can lead to selective sensing of target analytes.

Prof. Ramón Martínez-Máñez
Guest Editor
Co-chair of the Editorial Advisory Board
ChemistryOpen

[a] *Prof. R. Martínez-Máñez*
Centro de Reconocimiento Molecular y Desarrollo Tecnológico (IDM), Unidad Mixta Universidad Politécnica de Valencia–Universidad de Valencia, Departamento de Química, Universidad Politécnica de Valencia, Camino de Vera s/n, 46022, Valencia (Spain)
and CIBER de Bioingeniería, Biomateriales y Nanomedicina (CIBER-BBN)
E-mail: rmaez@qim.upv.es

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