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ANNOUNCEMENT

International Union of Pure and Applied Chemistry Physical Chemistry Division, Steering Committee on Biophysical Chemistry, Analytical Chemistry Division, Commission V.5 (Electroanalytical Chemistry) Electrochemical Biosensors: Proposed Definition and Classification

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Two Divisions of the International Union of Pure and Applied Chemistry (IUPAC), namely the Physical Chemistry (Steering Committee on Biophysical Chemistry) and the Analytical Chemistry (Commission V.5 on Electoranalytical Chemistry), are preparing recommendations on the definition, classification and nomenclature relating to electrochemical biosensors. The scope is deliberately limited to electrochemical transducers, but could, in the future, be extended to other types of biosensors. While these recommendations are discussed within IUPAC bodies and before a final approval is obtained for publication in *Pure and Applied Chemistry*, the following proposals are made and comments are accordingly solicited.

A **biosensor** is a **self-contained integrated device** which is capable of providing specific quantitative or semi-quantitative analytical information using a **biological recognition element (biochemical receptor) which is in direct spatial contact with a transduction element**. We recommend that a biosensor should be clearly distinguished from a **bioanalytical system** which requires *additional processing steps*, such as reagent addition. Furthermore, a biosensor should be distinguished from a **bioprobe** which is either *disposable* after one measurement, i.e. single use, or unable to *continuously monitor* the analyte concentration.

Biosensors may be classified according to the **biological specificity-conferring mechanism** or, alternatively, to the **mode of physico-chemical signal transduction**. The biological recognition element may be based on a *chemical reaction catalyzed* by, or on an *equilibrium reaction* with, macromolecules that have been either isolated, engineered or present in their original biological environment. In the latter cases, equilibrium is generally reached and no further net consumption of analyte(s), if any, is achieved by the immobilized biocomplexing agent incorporated into the sensor. Biosensors may be further classified according to the **species or reactions** that they monitor: direct monitoring of *analyte concentration or activity*, or of *reactions* producing or consuming such substrates; alternatively, an indirect monitoring of *inhibitor or activator* of the biological recognition element (biochemical receptor) may be achieved.

The rapid proliferation of biosensors and their diversity has led to a lack of rigor in defining performance criteria. Although each biosensor can only truly be evaluated for a particular application, it is still useful to examine how **standard protocols for performance criteria** may be defined in accordance with standard IUPAC protocols or definitions. These criteria are recommended for authors, referees and educators and include: calibration characteristics (sensitivity, operational and linear range, detection limits), selectivity, reliability, steady-state and transient response times, sample throughput, repeatability and lifetime.