Amperometric Gas Sensors with Ionic Liquid Electrolytes

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Room temperature ionic liquids have been of interest among the analytical chemistry and chemical sensor communities in recent years, primarily because of their promise in designing new sensors and new analytical methods with improved capabilities, utilizing the unique and diverse chemistry possible with these materials [1-9].

We will discuss new amperometric gas sensors developed at KWJ Engineering, that utilize ionic liquid electrolytes, in both conventional and printed formats. The printed sensor approach exploits modern screen printing and printed electronics strategies to produce a high performance gas sensor at low cost [10,11]. The screen-printed electrochemical sensor (SPEC, Figure 1) shows great promise to provide a new avenue to miniaturized, high-performance, low-cost monitoring of toxic gases, i.e. to bridge the cost-performance gap in gas sensing technology, in addition to enabling battery free operation. The platform provides high sensitivity, high selectivity, low detection limit, low power operation, a small, thin form factor and scalable manufacturing potential are key enabling features of the technology. We envision these key attributes to be augmented by selection of ionic liquid electrolytes that optimize sensor performance in specific applications.

This presentation will cover the fundamentals of amperometric gas sensing, the transition of this well-established approach to the printed device and specific illustrative examples of applications of conventional and printed gas sensor formats using ionic liquid components.

References


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Figure 1. Conventional (top) and prototype printed (bottom) amperometric gas sensors.