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A Chemical Sensor Based on an Integrated Electrochemical and Electrical Detection

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Inventors

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Invention Description

Electrochemical sensors are widely used in numerous chemical and medical applications to detect concentrations of analytes. Electrical sensors are also widely used to determine analyte concentrations detecting molecular binding-induced conductance or impedance changes in electrical materials. Although both sensing techniques have proven extremely useful, there are some severe limitations to each technique. When using electrochemical sensors, the amount of analyte detected in directly proportional to the current flowing through the sensor, and therefore, small analyte concentrations go undetected. Electrical sensors tend to be expensive to manufacture and their function tends to be highly dependent on environment, leading to less specific and less accurate results. Thus, this already well received technique would surely welcome an improvement in detection limits and accuracy.

In an attempt to enhance current sensing technology, researchers at Arizona State University have developed an integrated sensing device capable of detecting analytes using electrochemical and electrical signals. The device introduces synergistic new capabilities and enhances the sensitivity and selectivity for real-time detection of an analyte in complex matrices, including the presence of high concentration of interferences in liquids and in gas phases.

Potential Applications

- **Clinical Diagnostics**
- **Medical Devices**
- **Agriculture**
- **National security and defense**

Intellectual Property Status:
Patent Pending

Benefits and Advantages

- **Increased Sensitivity**- Detecting analyte concentrations in the pM range
- **Analyte selectivity enhancement**- maximizing selectivity by combining specific electrochemical reactions with functionalized sensors surface
- **Detection of analyte in impure samples**
- **Real time analyte detection**- Millisecond response time
- **Platform compatible for integration with other detection techniques**

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