

## Single-stage, highly reproducible electrochemical sensors

High resolution, single-step sensor for electrolyte measurement at home and in the clinic

Patients with conditions such as hypoparathyroidism, heart failure, bipolar disorder, and end-stage renal disease face the challenge of maintaining stable concentrations of one or more electrolytes. Frequent and timely monitoring of blood electrolytes is an essential preventative measure which can help delay or avert various complications including death. However, this is difficult in current testing regimes which rely on venipuncture blood draws in hospitals or testing facilities using larger testing apparatus that require fluidic pumps and larger volumes of sample. Conventional methods such as ionophore-based ion-selective electrodes used in hospital clinics suffer from sensor-to-sensor variations in voltage that result in diagnostic errors. Therefore, there is a strong clinical and patient need to develop sensors that are highly reproducible to enable calibration-free home use.

### The technology

VCU researchers created a disposable electrolyte sensing platform that can be used at home by patients in a similar manner to the use of disposable glucose meters by diabetic patients. This new device uses substantially less sample volume (5x less) while providing high resolution measurement of ionic electrolytes in blood. This device can be manufactured by convention and additive approaches and has the ability to measure blood electrolytes such as K<sup>+</sup>, Li<sup>+</sup>, Na<sup>+</sup>, Ca<sup>2+</sup>, Mg<sup>2+</sup>, and Cl<sup>-</sup>. This system is highly suited for home use as it has a simple architecture without any fluidic systems or moving parts and is amenable to storage due to its compact size and stable reagents.

### Benefits

- » Single stage measurement
- » No fluidic intervention necessary
- » Low sample volume needed
- » High resolution and accuracy
- » Low cost

### Applications

- » At home measurement of electrolytes and blood monitoring
- » Clinical high throughput measurement of electrolytes and blood monitoring
- » Electrochemical sensors for ionic compounds

#### Patent status:

Patent pending: U.S. and foreign rights are available.

#### License status:

This technology is available for licensing to industry for further development and commercialization.

#### Category:

Material Science and Engineering  
Biomedical Devices

#### VCU Tech #:

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