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# Label-Free Transistor-based Biosensor (20140298, Dr. Dorfman, Dr. Frisbie)

**IP Status:** Issued US Patent; **Application #:** 15/503,277

### Floating-gate Electrode

Portable, label-free detection of molecules such as DNA, proteins, antibodies and more is possible with a new potentiometric technology employing an electrolyte-gated transistor (EGT) in conjunction with a floating-gate electrode. The presence of bound target molecules on the surface of the floating gate changes the measured electrical properties of the device. The sensor relies on an EGT that uses the high capacitance of mobile ions to modulate the conductivity of an organic semiconductor under the application of low input voltages. The fabrication method, ease of use and compatibility with flexible substrates allows this new design to be easily multiplexed for field applications in forensics, biothreat detection and pathogen screening.

### Low Voltage Operation

The floating-gate electrode electronically connects the analyte-containing solution to the EGT while keeping them both physically separate. The low voltage operation of the EGT is essential to successful detection since small voltage offsets still create measureable changes in drain current. The low operating voltages of this device make it amenable to a variety of printable, lab-on-a-flexible-substrate schemes.

**BENEFITS AND FEATURES OF LABEL-FREE TRANSISTOR-BASED DNA BIOSENSOR:**

- Enhanced signal resolution
- Detects a variety of molecules, including DNA, proteins, antibodies, etc.
- Easily multiplexed for biothreat detection, pathogen screening and forensics
- Less sensitive to noise
- Compatible with portable or hand-held applications
- May be used in point-of-care diagnostics

**Phase of Development** - Proof of concept

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