**Docket #:** S07-156

# Aqueous Phase Chemical Detection Based on Low-Voltage OTFT

Zhenan Bao's group at Stanford has developed a method for fabricating low-operating voltage OTFTs for functional electronic sensors in aqueous media. Low-voltage operation is achieved through the use of a thin, cross-linked polymer gate dielectric film, which allows for stable operation in water without any encapsulation. This technology has been used to demonstrate stable and reversible chemical detection in aqueous solutions for concentrations down to parts-per-billion levels.

**Ongoing Research**
The inventors have demonstrated chemical detection in water using OTFTs on plastic, flexible substrates. Additionally, the researchers have fabricated water-stable OTFT sensors using carbon nanotube networks as the active sensor layer (in place of the organic semiconductor) that detected below 10 parts per billion TNT (explosive) and DMMP (nerve agent simulant).

## Applications

- Underwater biosensors
- Underwater sensors

## Advantages

- Transistors are functional under water

## Publications

- Roberts, Mark E.; Mannsfeld, Stefan C.B.; Stoltenberg, Randall M. and Bao, Zhenan (2009), "Flexible, plastic transistor-based chemical sensors" *Organic Electronics* available online 12/11/2008.
- Roberts, Mark E.; Mannsfeld, Stefan C.B.; Tang, Ming Lee and Bao, Zhenan (2008-12-02). "Influence of Molecular Structure and Film Properties on the Water-Stability and Sensor Characteristics of Organic Transistors". *Chemistry of Materials* 02 December 2008.
- Roberts, Mark E.; Mannsfeld, Stefan C.B.; Queralto, Nuria, Reese, Colin, Locklin, Jason and Knoll, Wolfgang (2008-08-26). "Water-stable organic transistors and their application in chemical and biological sensors". *Proceedings of the National Academy of Sciences* August 26, 2008. Vol. 105 No. 34: 12134-12139.


## Patents

- Published Application: 20150064798

## Innovators

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