# Nanomechanical Sensor Detects and Identifies Chemical Analytes

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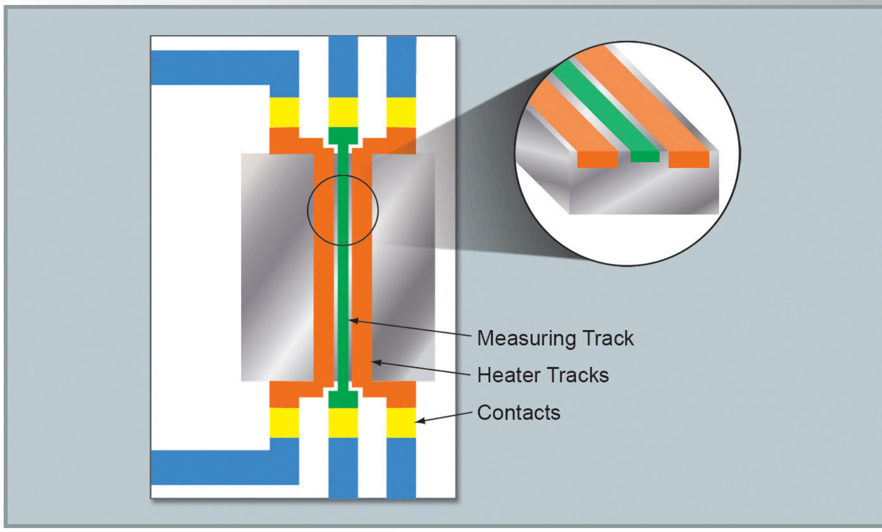


## Technology Summary

ORNL researchers developed a cost-efficient nanomechanical sensor that can detect chemicals adsorbed to a surface and then quickly analyze and identify those chemicals. The device is a significant improvement over current detection technologies, which are not able to perform reliable identification. Rapid identification of trace amounts of chemicals(e.g., polymers, explosives) is important for ensuring safety in pharmaceutical, transportation, and other sectors.

The invention takes advantage of the unique "thermal fingerprint," or the thermal response of individual chemicals to high heat, to identify their properties. The device can evaluate the purity of pharmaceuticals, investigate the temperature-dependent properties of very small (sub-nanogram) quantities of polymers, and detect and identify explosives. It can also quickly identify a potentially harmful chemical.

The invention's sensitivity and selectivity open up new possibilities for a single sensor–based technique that does not use a chemoselective layer for sensing. This method may also provide a technique for investigating thermally induced properties of a wide range of materials, far beyond what is possible by conventional techniques.

## Advantages

- Detection and identification of adsorbed chemicals
- Detection of sub-nanogram (less than a billionth of a gram) amounts of materials without relying on receptors or separation methods
- Operation with a continuously repeated process, without resorting to chemical cleaning techniques after each thermal cycle
- Sized for easy integration into a hand-held devices

## Potential Applications

- Detecting and identifying individual explosives
- Detecting and identifying nonexplosive chemicals
- Investigating the oxidative stability of chemical analytes
- Evaluating the purity of pharmaceuticals
- Investigating the temperature-dependent properties of sub-nanogram quantities of polymers

## Patent

Dechang Yi, Lawrence R. Senesac, and Thomas G. Thundat, *Sensor for Detecting and Differentiating Chemical Analytes,* U.S. Patent Application 12/198,580, filed August 26, 2008.

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