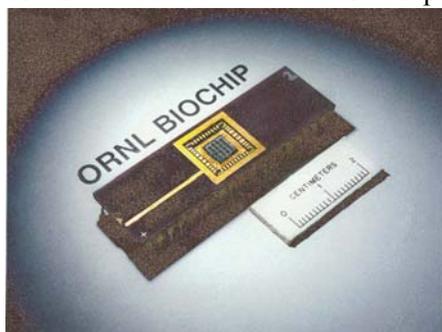


## Advanced Multifunctional Biochip

### Technical Concept

The Advanced Biomedical Science and Technology Group, Life Science Division, has been developing a unique sensing tool, the advanced multifunctional biochip, for BW agent detection for the past several years, funded by the DOE Chemical-Biological Non-Proliferation Program.

The heart of the technology is an electronic microchip, which has multiple highly sensitive photosensors based on complementary metal oxide semiconductor (CMOS) microchips, which can independently and simultaneously read fluorescence from bioreceptors (DNA, antibodies) addressed to each microchip element. Coupling this microchip with a miniature diode laser, associated optics, appropriate fluidics systems for assay solution handling and use of the highly sensitive bioassays results in a device which can be adapted for a variety of applications at the physician's office or in the field. Integration of an air sampler and agent concentrator allows detection of airborne agent, while a liquid collection system would allow water testing.

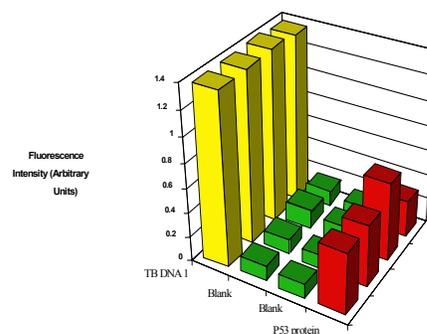


The Integrated Circuit Biochip

The bioassays employed test for DNA signatures and unique protein antigenic signatures simultaneously, so that agents can be positively identified by two independent biomarkers. The use of fluorescence-based assay schemes coupled with laser excitation provides great detection sensitivity, while the use of ultra-small assay volumes reduces

### Development Approach

The Advanced Multifunctional Biochip device is being developed as a generic device for DOE applications. Research and development efforts are currently being devoted to develop a device specific for medical diagnostics, environmental sensing, homeland defense by integrating components into a complete, rugged, field-portable unit which can be successfully used by minimally trained personnel.



Biochip Detection of Tuberculosis and p53 cancer gene

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