# USF Available Technologies

Technology Transfer Office

# DNA Biochip and Methods of Use

Researchers at the University of South Florida have developed a DNA Biochip for detecting nucleic acid sequences.

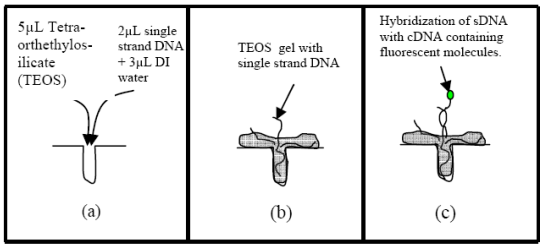
DNA plays an important role in many cellular processes like replication, homologous recombination and transcription. And Biochips, particularly those based on DNA, are powerful devices that integrate the specificity and selectivity of biological molecules with electronic control and parallel processing of information. This combination will potentially increase the speed and reliability of biological analysis. Microelectronic technology is especially suited for this purpose since it enables low-temperature processing and thus allows fabrication of electronic devices on a wide variety of substances like glass, plastic, stainless steel and silica wafer. Biosensors using immobilized receptors are finding ever-increasing application in a wide variety of fields such as clinical diagnostics, environmental monitoring, food and drinking water safety, and monitoring of illicit drugs.

USF inventors have developed a interesting silicon-based "biochip" containing micro cavities. These cavities can have specific nucleic acid sequences attached to them. When the nucleic acid used for detection hybridizes with a nucleotide sequence of a nucleic acid immobilized on the silicon, the hybridized sequences can be detected by direct or indirect means and thus the target nucleic acid is thereby detected. These DNA sequences can be very specific to the target DNA sequence in a test sample. An oligonucleotide probe can also be labeled with a fluorescent molecule. Thus, when the desired DNA sequence is detected, the sample will fluoresce.

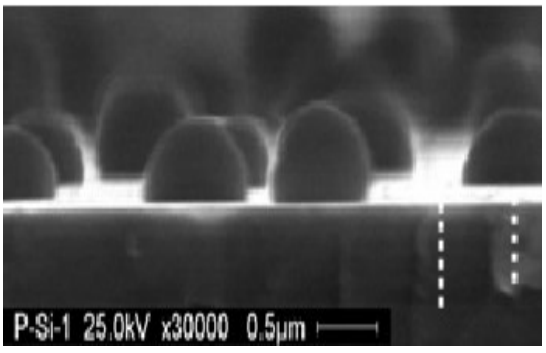
The present invention can be used to detect nucleic acid sequences associated with bacteria, viruses, fungi, protozoans, and the like.

## ADVANTAGES:

- **High responsiveness, selectivity and low cost. Does not induce an immune response**
- **Enormous surface area, ranging from 90 to 783 m2/cm3**
- **Room temperature luminescence spans the visible spectrum which makes it an effective transducer**




**Figures 1a-1c.** Preparation of DNA fixation and hybridization with fluorescent molecules on porous silicon (PS) using Tetra-orthethylosilicate TEOS.




*A scanning electron microscope picture of porous silicon*

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