

Sensors

Biomarker Sensor Arrays for Microfluidics Applications

For multi-color imaging and processing of single-molecule life signatures

NASA's Jet Propulsion Laboratory offers a method to manufacture biomarker sensor arrays with nanoscale resolution and active regions on the order of 1 micron, by applying nanolithographic direct-write techniques to the fabrication of silane chemistry sensors on a transparent substrate. This novel technology enables extremely fine patterns of detectors suitable for multicolor imaging of single-molecule samples at resolutions far below the diffraction limit. The extremely small size of these sensors allows for rapid, highly specific screening for hundreds of functionalities within a single, small, integrated microfluidics chip.

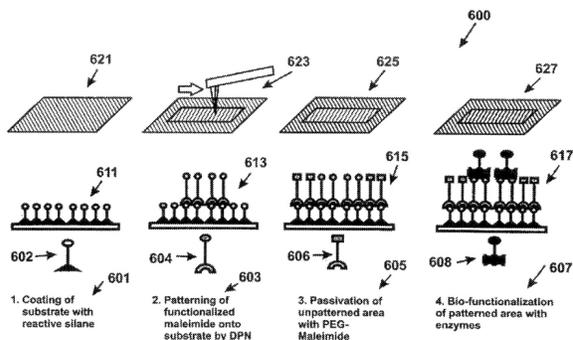
BENEFITS

- Able to rapidly interrogate, with high selectivity, very sparse samples within microfluidic systems

technology solution

THE TECHNOLOGY

This invention provides a method and system for fabricating a biomarker sensor array by dispensing one or more entities using a precisely positioned, electrically biased nanoprobe immersed in a buffered fluid over a transparent substrate. Fine patterning of the substrate can be achieved by positioning and selectively biasing the probe in a particular region, changing the pH in a sharp, localized volume of fluid less than 100 nm in diameter, resulting in a selective processing of that region. One example of the implementation of this technique is related to Dip-Pen Nanolithography (DPN), where an Atomic Force Microscope probe can be used as a “pen” to write protein and DNA Aptamer ‘inks’ on a transparent substrate functionalized with silane-based self-assembled monolayers. But it would be recognized that the invention has a much broader range of applicability. For example, the invention can be applied to formation of patterns using biological materials, chemical materials, metals, polymers, semiconductors, small molecules, organic and inorganic thin films, or any combination of these.



Schematic of method to manufacture biomarker sensor arrays

APPLICATIONS

The technology has several potential applications:

Life sciences – medical diagnostic systems, pharmaceutical research

Security – detection of toxins and bio-weapons

Agriculture – processing and analysis of soil samples

PUBLICATIONS

U.S. Patent 8,492,160

National Aeronautics and Space Administration

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NP-2014-08-1144-HQ

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NPO-41506-2

