Detection of low concentration biological agents

Tech ID: 22233 / UC Case 2011-360-0

BRIEF DESCRIPTION

Researchers at UCI have developed a rapid and inexpensive fluorescent-based immunoassay scaffold, which offers a 16-fold increase in detection sensitivity compared to standard techniques.

SUGGESTED USES

- For use in fluorescent-based immunoassay tests
- For the detection of low-concentration biological analytes.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,035,765	06/15/2021	2011-360

FULL DESCRIPTION

Immunoassays, which use antibodies to measure the concentration of a given analyte, have found use in applications ranging from medical diagnostics to drug development and validation. As antibodies selectively bind to only one type of molecule, immunoassays are highly specific and can be used to detect a variety of analytes in biological samples. Though several different types of immunoassays have been developed, one of the most common measures the fluorescence emitted from the sample, typically after the analyte of interest binds to the antibody. Despite their popularity, high sensitivity immunoassays are often labor intensive, time consuming, and require expensive reagents. Such drawbacks limit their use in point-of-care diagnostics, which would require a rapid, inexpensive, and highly sensitive test.

To increase the sensitivity and response time, researchers at UCI have developed a novel way of constructing immunoassay platforms. The antibody (or other analyte-binding agent) is deposited onto a silica-coated polymer shrink film using a simple technique such as drop-casting or spin-coating. The sample covalently binds to the silica, anchoring it robustly to the surface of the film. Next, the polymer film is shrunk either through heating or applying stress, depending on the polymer type. This shrinking, which can reduce film size from 60%-99%, concentrates the sample on the surface of the scaffold, leading to a much higher density of detectors than is typically possible. Such high densities have been shown to increase the fluorescent signal by a factor of 16, which provides a much more sensitive method for detecting the presence of analytes than standard techniques. In addition to this increased sensitivity, the immunoassay is also simple and inexpensive to construct, and allows for rapid detection of biological analytes.

ADVANTAGES

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OTHER INFORMATION

KEYWORDS

immunoassay, fluorescence, fluoroimmunoassay, chip, microfluidic

CATEGORIZED AS

- **Optics and Photonics**
  - All Optics and Photonics
- **Materials & Chemicals**
  - Biological
  - Polymers
  - Thin Films
- **Medical**
  - Diagnostics
  - Research Tools
  - Screening

· Sensitive: This method offers a 16-fold enhancement in detection efficiency compared to standard fluorescent immunoassays.

· Simple and inexpensive: The scaffold is constructed from common materials (silica, polymer shrink films), and reagents are added by simple sol-gel methods.

· Rapid: Like other fluorescent immunoassays, this method offers rapid detection of biological analytes, with measurements typically taking a few minutes.

STATE OF DEVELOPMENT

In vitro studies have been performed.

» **Nanotechnology**
» NanoBio
» **Research Tools**
» Antibodies
» Other
» Reagents
» Screening Assays

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