Textile-Based Printable Electrodes for Electrochemical Sensing

Tech ID: 20948 / UC Case 2010-291-0

BACKGROUND

As the focus on healthcare shifts from centralized hospital-based treatment to home-based or personal management, there is a growing need for reliable, wearable healthcare monitoring systems. Early efforts in this direction integrated physical sensors into clothing for monitoring of vital signs. Little attention has been given to wearable chemical sensors despite the fact that electrochemical sensing devices are ideally suited for meeting the requirements of on-body physiological monitoring. The present invention fills this technological gap.

TECHNOLOGY DESCRIPTION

UC San Diego researchers have developed thick-film amperometric and potentiometric sensors that are screen-printed directly on textiles. The sensors exhibit electrochemical and mechanical properties that enable their use in clothing-integrated healthcare, sports, military, security, environmental, and other related applications. Early proof of concept has been accomplished with carbon electrodes printed on elastic waistbands of underwear: these tested favorably in the laboratory for electrochemical performance under various conditions of deformation (folding, stretching, sticking). Such elastic-band-based sensors can, for example, be used in direct sweat monitoring of alcohol consumption in drivers or performance/stress of soldiers/athletes. More generally, the printed sensors will be incorporated into biocomputing systems that can make autonomous diagnoses and administer drugs based on specific combinations of biomarkers. The invention provides printing protocols and ink formulations and viscosities tailored for specific substrate textile materials to optimize printing quality, electrochemical sensor performance, and mechanical robustness.

INTELLECTUAL PROPERTY INFO

This technology has a patent pending and is available for licensing and/or sponsorship.

RELATED MATERIALS

- Thick-Film Textile-based Amperometric Sensors and Biosensors, Analyst, 135 (2010) 1230.
- NanoEngineers Print and Test Chemical Sensors on Elastic Waistbands of Underwear
- Two-Minute Video: NanoEngineers Print and Test Chemical Sensors on Elastic Waistband of Underwear
- Biosensors in Briefs
- 'Smart' Underpants For Home Health Care
- U.S. Scientists Design Smart Underpants that Could Save Lives
- 10 Smart Clothes You'll Be Wearing Soon

OTHER INFORMATION

SD2009-299 “Enzyme-Logic Biosensing for Rapid Diagnostics”

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,844,339	12/19/2017	2010-291
United States Of America	Issued Patent	9,125,625	09/08/2015	2010-291
United States Of America	Published Application	20190090809	03/28/2019	2010-291

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OTHER INFORMATION

KEYWORDS

electrochemical sensor, amperometric sensor, textile-based sensor, printable electrode, wearable healthcare monitoring, smart clothes

CATEGORIZED AS

- **Medical**
  - Devices
  - Diagnostics
- **Security and Defense**
  - Other
- **Sensors & Instrumentation**
  - Environmental Sensors
  - Medical

RELATED CASES

2010-291-0, 2009-299-1

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