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Dielectrophoresis and Electrodeposition Process for Selective Particle Entrapment

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OTHER INFORMATION

CATEGORIZED AS

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BRIEF DESCRIPTION

University of California, Irvine, researchers have invented a fast, efficient manufacturing process for adding scalable micro-features to electrode systems.

FULL DESCRIPTION

Attempts to add micro-features to electrode systems have been fraught with limitations, including inordinate processing time, complexity, unpredictability, and energy consumption. Various forms of etching, attempting to improve the response of electrochemical sensors by increasing hydrophilicity through increasing surface area have not had a sufficient influence over the feature size to accomplish that goal. Electrochemical pretreatment, which involves exposing a conductive structure to a DC potential has been known to cause permanent damage to the structure. Additionally, using three-dimensional structures as a surface of deposit for organic beads from a liquid bath has resulted in a too weak and temporary attachment.

Researchers have overcome these limitations using a combination of dielectrophoresis and electrodeposition in a manner that yields great control over the surface morphology of the microfabricated structure. This unique process allows for flexibility in the selection of materials, low processing time, and low energy consumption.

SUGGESTED USES

This process has numerous potential applications in electrochemistry including improving electrodes for use in batteries, fuel and solar cells, capacitors, and sensors, or in biotechnology for trapping beads functionalized with biomolecules onto the electrode surface.

ADVANTAGES

- Advantages over existing technology include:
- Low processing time
 - Low energy consumption
 - Absence of high temperatures [allows work with active biomolecules]
 - Increased control over surface morphology [allows selection of beads of specific size and character (organic, inorganic, biological); ability to attach different beads to one another creating virtually any geometric configuration]
 - Strong bead attachment

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,353,455	05/31/2016	2013-550

