Covert, Robust ID Tags for Medical Devices
Technology #15231

Applications

The microparticle encoding method is applicable to covert multiparticle barcoding of medical devices, multiplexed bioassays, forensic product labeling, high-temperature cast object labeling, and anti-counterfeiting measures.

Problem Addressed

Unique encoding of single units within information-intensive processes requires high encoding capacities (10^5-10^12) and high-throughput particle synthesis, which is out of reach for many current systems. Current encoding architecture designs focus on advancing the capabilities of individual components – encoding, synthesis or decoding methodologies – at the expense of overall performance.

Technology

The invention is an encoding strategy that is compatible with high-throughput particle synthesis and portable CCD-based decoding. Unique particle barcodes are generated by micropatterning spectrally distinct upconversion nanocrystals (UCNs). A versatile, high-performance stop-flow lithography (SFL) technique is used for synthesizing chemically anisotropic particles. The particles can be made from a vast range of polymeric or ceramic materials in any shape and size. The material properties can thus be tuned to fit the needs of the intended use of the method, such as biocompatibility, temperature resistance, scratch resistance or superior adhesion in the presence of diverse solvents.

Advantages

- Exponentially scalable encoding capacities (>10^6 particles)
- Ultralow decoding false-alarm rate (<1 error per billion reads)
- Ability to manipulate particles by applying magnetic fields
- Dramatic insensitivity to both particle chemistry and harsh processing conditions

Categories For This Invention:

- Lincoln Laboratory
- Materials
- Micro & Nanotech
- Life Sciences
- Biomaterials
- Micro/nanoparticles (Biomaterials)
**Intellectual Property:**

Rare earth spatial/spectral barcodes for multiplexed biochemical testing  
Issued US Patent  
9,528,145  
Rare earth spatial/spectral barcodes for multiplexed biochemical testing  
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**Publications:**

Universal Process-Inert Encoding Architecture for Polymer Microparticles  
Nature Materials  

**External Links:**

Doyle Group  
[https://doylegroup.mit.edu/](https://doylegroup.mit.edu/)  
Lincoln Lab  
[http://www.ll.mit.edu/](http://www.ll.mit.edu/)

**Image Gallery:**

![Image of barcode illustration](image-url)