



TECHNOLOGY

Lateral Two-Terminal Nanotube Devices and Method for their Formation

OVERVIEW

Researchers at the University of Maryland have developed a method to enhance the efficiency of energy capture, storage, and delivery. Applications include solar energy capture, energy storage in capacitors and batteries, and integration of capture and storage elements within a thin film process technology to provide high performance energy/power systems at modest cost.

The invention introduces a novel approach for forming lateral nanotube energy capture and storage devices that may be configured in arrays. Lateral nanopores are created as anodic aluminum oxide (AAO) nanopores parallel to the surface from an initial aluminum layer. Atomic layer deposition (ALD), electrochemical deposition (ECD) and other processes are used to insert material into the nanopores such that active regions are separately contacted by wiring at opposite ends of the nanostructures. The unique combination of AAO with ALD/ECD enables material to be structured in the nanopores with large active volumes (depletion region for solar cells, capacitor surface area for storage devices) and to achieve the first energy devices from lateral AAO.

The devices are compatible with conventional thin film processing and with multilayers of lateral nanotube devices. For solar energy capture, the multilayer embodiments enable more efficient capture and tuning optical absorption in different layers to different parts of the spectrum. For energy storage, the structures promise high burst power for distributed sensor/actuator systems and other applications. Finally, capture and storage layers may be vertically stacked and combined with control electronics to provide integrated energy systems on a single platform with a common fabrication and process technology.

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Additional Information

INSTITUTION

University of Maryland, College Park

PATENT STATUS

Patent(s) pending

LICENSE STATUS

Contact OTC for licensing information

CATEGORIES

- Nanotechnology + Nanoparticles + Nanomaterials

EXTERNAL RESOURCES

- [US Patent 8,378,333](#)

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