Mit Technology Licensing Office ,United States

Our mission is to bring about, through technology licensing, commercial investment in the development of inventions and discoveries flowing from research at the Massachusetts Institute of Technology and Lincoln Laboratory.

It is through these investments -- and the economic development and new products that follow from them -- that MIT technology provides direct benefits to the public.

Services

The TLO’s job is to work with you to bring these breakthrough discoveries to the widest possible audience by:

• Evaluating your inventions for commercial potential
• Securing protection for inventions, where appropriate
• Working with industry to ensure appropriate development and commercialization of your inventions

- **Sector :**Technology Transfer

Team

- AFARIN BELLISARIO, Technology Licensing Officer

High Voltage Thin Film Transistors For High Voltage Systems On Flexible And Curved Surfaces, No:15405

Sector : Electronics

This organic semiconductor thin film transistor achieves high voltages by offsetting the drain or source electrode and the gated channel. This creates an ungated semiconductor region in series with a gated semiconductor region, which limits the voltage dropped across the latter region. The excess voltage is then dropped across the ungated semiconductor thus enabling high voltage operation.

Description

However many applications of FETs require drive voltages larger than 100 V with relatively small input voltages.

To combat the problems associated with FETs, a high voltage field effect transistor has been fabricated using thin-film organic semiconductor technology. High driving voltages are achieved by offsetting the drain or source electrode from the gate creating an un-gated semiconductor region in series with a gated semiconductor region. This achievement represents the first demonstration of integrated high voltage thin film transistors based on an organic semiconductor technology with a low temperature (

Primary Benefits

Advantages

• Achieves high output voltage with organic semiconductor technology
• Uses a low temperature (

Cmos Integration Of Mems Resonators

Sector : Electronics

MEMS resonators are widely used in applications such as communications, inertial sensing, navigation, etc. Integration of MEMS resonators with CMOS to form a single chip solution allows operation at GHz-frequencies, while reducing size, weight, and power consumption of the overall system. However, such integration is challenging as it usually results in reduced circuit performance as well as increased process complexity, reduced yield, and ultimately in increased cost.

Description

This technology describes the design of high-Q MEMS resonators which may be seamlessly integrated into a CMOS stack without requiring any packaging or post processing. The device relies on solid-state acoustic localization structures such as a Phononic crystal (PnC) which may be patterned using materials easily available in the CMOS stack. Two earlier MIT Cases, 14571 and 14912, describe CMOS compatible MEMS structures increasing the quality factor (Q) of unreleased MEMS resonators through incorporation of acoustic Bragg reflectors and the use of a piezoelectric material rather than dielectric within the MEMS resonator to reduce the impedance at resonance and increase the electromechanical coupling coefficient.

Primary Benefits

• Fully CMOS compatible, requires no packaging or post-processing
• Multiple resonators with different frequencies may be fabricated on the same device with a single mask
• Very high quality (Q) factor (>10,000)
• Small footprint
• Low power consumption
• Reduced spurious modes

Development Status

- **Stage of Development :** Prototype
- **Time to Market :** 3-5 year

Market & Competition

Applications for this technology include wireless communication, telecommunication, microprocessor technology, and transceiver circuitry.

Potential Sectors	**Potential Regions**
Communications	United States
Electronics	

Interest In

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Circuit And Method To Improve Energy Harvesting Efficiency In Piezoelectric Harvesters

Sector : Electronics

Microchip designs to efficiently harvest energy from mechanical vibrations.

Description

This invention presents a circuit technology using a bias-flip rectifier technique which improves multi-fold, the power extraction capability as compared to conventional full-bridge rectifiers and voltage doublers. The bias-flip rectifier uses an inductor which can be shared with a multiplicity of DC-DC converters on the same energy processing circuit through an arbiter which controls access to the inductor. On-chip implementation of a gate-drive circuit can prevent the bias-flip switches from breaking down due to high voltage. The technology is not limited to piezoelectric harvesters and can be used in general with any input having similar electrical characteristics to a piezoelectric harvester.

Primary Benefits

• Improved efficiency in energy harvesting

Development Status

- **Stage of Development :** Prototype
- **Time to Market :** 1-3 year

Market & Competition

These designs address the currently low energy harvesting efficiency of piezoelectric harvesters. Technology has various energy harvesting applications such as battery life-time enhancer, pressure sensors, wireless sensor nodes, etc.

Potential Sectors	**Potential Regions**
Energy	United States
Electronics	EU

Interest In

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Omnidirectional Tissue Illuminator

Sector : Medical

This invention pertains to a biocompatible optical fiber with a thin, tapered tip that allows light to be uniformly delivered to or received from a much larger volume than conventional optical fibers. This illuminator has a thin, etched light emitting tip which can emit light in all surrounding directions over distances two to three orders of magnitude greater than the diameter of the fiber.

Description

The tapered shape and thin diameter of the tip minimize penetration damage, which is particularly important for biological and medical applications when this fiber is used in tissue. The large light emitting surface allows for more light to be delivered to a given volume of tissue than with conventional fibers. Because the light does not have to travel as far to illuminate a given volume, this fiber decreases the risk of tissue heating when used for in vivo application.

Primary Benefits

Advantages
-Delivers light to a much larger tissue volume than a conventional flat tipped optical fiber; minimal risk of tissue heating.
-Tapered and flexible tip made with poly(methyl methacrylate) (PMMA); no risk of fiber breaking and minimum penetration tissue damage.

Development Status

- **Stage of Development :** Proof of Concept
- **Time to Market :** 1-3 year

Market & Competition

Current optical fibers deliver/receive light from a flat or slightly modified tip, often with the light emitting/receiving surface area similar or equal to the cross-sectional area of the fiber. These conventional fibers often have limitations in meeting the light distribution needs for various applications and have the risk of tissue overheating and fiber breaking.

Applications

-Neuromodulation of large brain regions in conjunction with ontogenetic techniques
-Various medical applications: vascular surgery (angioplasty), stent repair, photo-cautery, photo- ablation, dermatological light-based therapy (tattoo removal, treatment of cystic acne, scars and warts, etc.), photoactivation of light caged drugs, photodynamic therapy, light sensitive prosthetic devices.
-Various industrial applications; i.e. food preparation and sanitation, cure light sensitive adhesives

Potential Sectors
Materials

Potential Regions
United States

Interest In

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Additive Manufacturing Of Electrospray Emitter Arrays And Other Microfluidic Systems, No: 17490

Sector : Nanotech

Applications for this technology include, water desalination, portable mass spectrometry, liquid fuel batteries, high-throughput nanofabrication, encapsulation of core-shell and core-shell-shell micro and nanoparticles, nanofabrications/manufacturing, lab-on-a-chip analytical systems, and nanosatellite electric propulsion.

Description

Additive manufacturing provides low-cost, versatile, and precise methods to fabricate electrospray devices and are microfluidic systems. This method can additionally make 3D microfluidic networks of varying aspect ratios that may be difficult or impossible to generate using silicon microfabrication methods. Finally, additive manufacturing may open up new applications that require electrospray emitters made from dielectric materials.

Primary Benefits

Advantages

• Low cost
• Easy implementation
• Versatile fabrication materials structures
• Fast fabrication

Development Status

- **Stage of Development :** Prototype
- **Time to Market :** 3-5 year

Market & Competition

Applications for this technology include, water desalination, portable mass spectrometry, liquid fuel batteries, high-throughput nanofabrication, encapsulation of core-shell and core-shell-shell micro and nanoparticles, nanofabrications/manufacturing, lab-on-a-chip analytical systems, and nanosatellite electric propulsion.

Potential Sectors	**Potential Regions**
Electronics Nanotech	United States

Interest In

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