

Bluefin™: Wearable Marine Environment Monitor

INTEGRATED SYSTEM

Wearable
Non-invasive
Stand-alone
Ultra-light weight
Physically stretchable

SENSORS FOR MONITORING AQUA ENVIRONMENT

Temperature sensing
pH monitoring
Salinity monitoring
Growth monitoring
Pressure/depth sensing

STANDALONE

Battery lifetime = 1 year
Wirelessly connected
Fully functional at 1.7 km depth
Tested for more than 6 months
Tested in oceanic environment



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'Marine Skin' Wearable Tracks Animals Under the Sea

A crab helped test a wearable that could eventually track ocean creatures such as dolphins and whale sharks

By Jeremy Hsu

Bluefin™ is a pioneering technology which is a stand-alone multi-sensory wearable electronic system that is non-invasive and has been used to continuously monitor the oceanic environment (temperature, depth, salinity, pH) down to a depth of 1.5 km for 6 months. It has a battery lifetime for 1 year, 10 cm² is the maximum size and weighs 2.4 grams or less. Its attachment to the marine species does not cause any harm at all.

- US Patent No. 10,952,412: Compliant, lightweight, non-invasive, standalone tagging system for marine exploration and method, Hussain, Muhammad M., Nassar, Joanna M., Khan, Sherjeel M., Velling, Seneca, J.
- First ever wearable electronic system specifically designed for marine environment.
- Used by wild sharks, blue crabs, stingray, bluefin tuna, etc.



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mmh Labs

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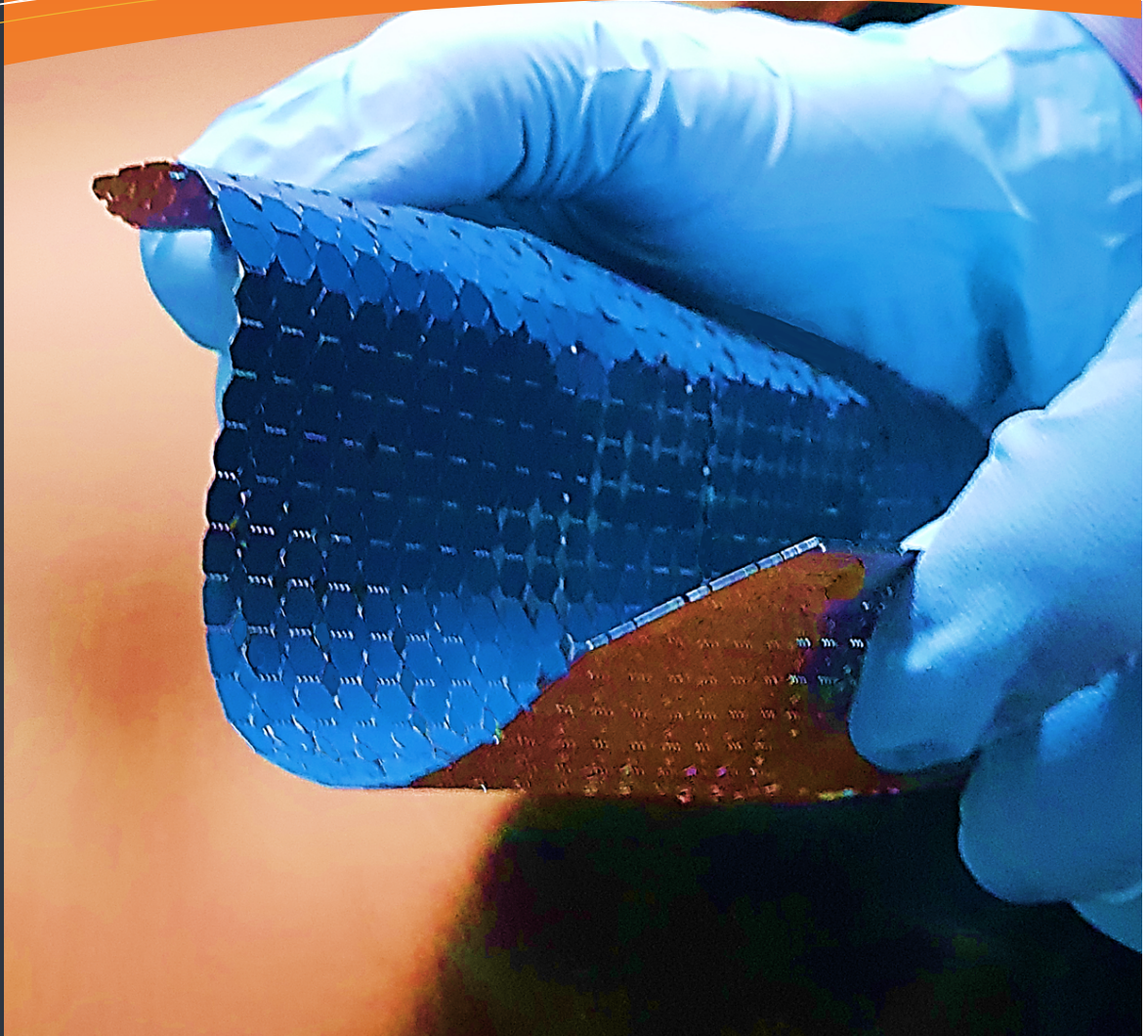
Shouro™: Ultra-Flexible & Stretchable Solar Cell

FLEXIBLE SOLAR CELLS

Ultra-flexible
High efficiency >20%
Light weight
Waterproof
Mechanically resilient
Enhanced thermal performance
Aesthetic appearance

STRETCHABLE SOLAR CELLS

World record stretchability
High efficiency >20%
Light weight
Waterproof
Mechanically resilient
Enhanced thermal performance
Aesthetic appearance



Shouro™ is a pioneering technology which consists of either an ultra-flexible or an ultra-stretchable and flexible solar cell with high efficiency that can be easily deployed on curved surfaces for powering various electronic devices. A bio-friendly polymer is used as an encapsulant to waterproof and improve the mechanical resilience of the solar cell. The power output can be up to 3 W, 25 square inch (156 cm²) is the size of the cell and weighs 11 grams.

- Shouro™ is developed by mmh Labs
- Patented technology: US 9,209,083, US 9,520,293, US 20220216355A1, US 20200212235A1
- World record flexibility (140 μm bending radius) and stretchability (95%).
- Used on curved and stretchable surfaces to power various electronic devices.

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