


A Boxfish is Bio-Inspiring New Materials for Robots and Flexible Electronics

By

The boxfish has unique armor that could serve as inspiration for body armor, robots and even flexible electronics, a [new research](#) has found.

Engineers at the University of California, San Diego, unveiled that a boxfish's hard frame and flexible body make it an ideal animal to study for inspiration for armor materials.

"The boxfish has been able to thrive in nature for over 35 million years with effectively the same armor," Steven Naleway a materials science and engineering Ph.D. student and co-author on the paper, told Clapway.

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HERE'S WHAT'S SO SPECIAL ABOUT THE BOXFISH

More than 1,000 tech experts, scientists and researchers have written a [letter](#) warning about the dangers of autonomous weapons and killer robots, so what could the boxfish actually do for the human race?

The boxfish is small and yet it survives in the ocean where it is surrounded by bigger, aggressive fish, at a depth of 50 to 100 meters. How? Thanks to its armor made of mineralized plates called scutes that – unlike many fish species – do not overlap, researchers found.

Instead at the interfaces of these scutes there are interdigitating structures known as sutures, able to provide a carapace that gives both strength and some flexibility to the fish.

“That means that there are no weak points, should a bite from a predator land exactly in between scales,” Naleway said. Together, the outer and inner layers of the boxfish armor provide the creature with protection unique in the natural world.



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BIO-INSPIRATION: FROM NATURE TO ROBOTS

Researchers are currently investigating what mechanical advantage boxfish’s design might provide to humans. The current research focuses on the characterization of bio-inspired materials.

“Expanding on this adaptation through the process of bio-inspiration, where features from nature are mimicked or used to inspire new devices and structures based in advanced materials and processing techniques, could allow for this same design to be applied to modern engineering issues where strength and flexibility need to be balanced,” Naleway explained.

BUILDING RESISTANT MATERIALS

A Multi-University Research Initiative, through the [U.S. Air Force Office of Scientific Research](#), is funding the study.

“This program brings together top researchers from a number of universities in order to investigate a common goal. In our case, the aim is to investigate a variety of biological organisms in order to learn about nature’s impact resistant materials”, Naleway explained.

According to professor Joanna McKittrick, a materials science expert and one of the senior authors on the paper, the approach is unique as researchers are using engineering principles to understand biological design.

What do you think of this new discovery and of how it could help designing the robots of the future? Share your opinion in the comments section below.

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