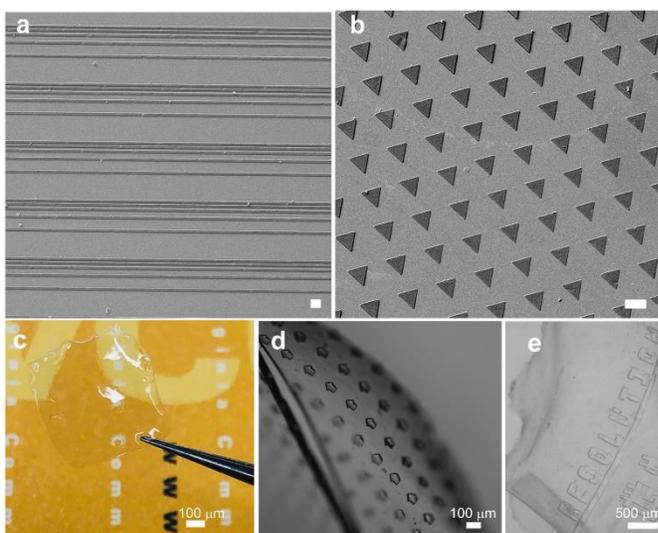


## Flexible and Biodegradable Films and Structures from Photoactive Chitin

Chitin is a renewable resource that can be sustainably and cheaply obtained from a variety of natural sources, including shrimp and crab shells. Chitin and its derivative, chitosan, have been used in numerous commercial and biomedical applications. For instance, chitin and chitosan are currently used to form biodegradable food packaging; however, the current processes utilize expensive strategies, such as chitin nanofibers, to form the product.

### The technology

Inventors at Virginia Commonwealth University have designed a novel method to chemically modify chitin and render it photoactive. This allows the formation of mechanically stable films and objects with engineered shapes and properties. The use of light to form precise structures and give the ability to form microstructures in two and three dimensions with high-throughput and spatial and temporal accuracy has yet to be shown with chitin, which can be obtained cheaply compared to chitosan. The new bioactive, photoactive chitin material developed using this novel method has properties superior to natural chitin, and can be used in a variety of commercial and biomedical applications. This photoactive chitin can form films in a scalable fashion while also allowing micro and macroscale patterning on the chitin itself to form biodegradable packaging for the food industry. The material can also be used to create new forms of naturally derived 3D scaffolds for tissue engineering and as substrates for flexible bioelectronics.



**Figure 1.** (a,b) Scanning Electron Microscopy (SEM) images showing the high-resolution architectures that can be formed using the photochitin material. Scale bar = 100  $\mu\text{m}$ . (c, d, e) Mechanically robust, flexible and micropatterned films can be formed at scale.

### Benefits

- » Biodegradable and biocompatible
- » Sustainable
- » Photoactive
- » Anti-bacterial
- » Low-cost, widely available material

### Applications

- » Biodegradable packaging for food
- » Naturally derived, biocompatible 3D scaffolds for tissue engineering
- » Substrates for flexible bioelectronics
- » Wound healing applications, such as a bandage material

#### Patent status:

Patent pending: U.S. and foreign rights are available.

#### License status:

This technology is available for licensing to industry for further development and commercialization.

#### Category:

Biomedical Engineering

#### VCU Tech #:

19-024

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