Researchers at the University of South Florida have invented a novel transforming lamina-emergent cone structure using bistable collapsible compliant mechanism technology.

The motivation for a multi configuration structure occurs in many applications such as aerospace applications, traffic-safety reflectors, and space-saving furniture. However, such designs lack the ability to be manufactured in micro-scale that will enable them to provide useful functions such as switches and relays. The applications and structures often consist of a number of parts or mechanisms that may consist of links, springs, and switches which often have high costs of manufacture, assembly, and maintenance.

Our inventors have designed a cone structure using bistable collapsible compliant mechanism technology. The transformation from a planar lamina shape to a cone shape requires only small pulling or compressing force to switch between the two states.

This new mechanism is utilized in a lamina-emergent cone, and is based on transforming a polygon spiral into spatial cone shape using a mechanism composed of compliant links and joints that exhibit bistable behavior. It will provide useful functions such as switches and relays, and can be manufactured on a microscale.

ADVANTAGES:

- Exhibits perfect bistable behavior
- Provides a shape-changing structure that morphs from a planar lamina to a cone
- Can be manufactured on microscale

Perfectly Modeled
Lamina-Emergent Cone

Lamina emergent cone in both stable positions, the planar position and cone position (top and side views)

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