Researchers reveal secret of ultra-slow motion of pine cones
11 November 2022, by Zhang Nannan

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In this work, the researchers revealed that VBs are composed of unique parallelly arranged spring/square microtubes forming heterostructures. The spring microtubes show much larger hygroscopic deformation than do square microtubes along the longitudinal axis direction. This deformation bends the VBs and consequently drives the scales to move as humidity changes.

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However, little attention has been paid to the fact that the hygroscopic motion of pine cones is an ultra-slow process. Hygroscopic deformation has long been attributed to the uneven hygroscopic expansion of vascular bundles (VBs) and sclereids, controlled by their different microfibril orientations. The mechanism cannot explain the observation that VBs themselves are capable of reversible hygroscopic motion. Therefore, the mechanism of ultra-slow motion in pine cones has long been unclear.

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unperceivable motion, which is two orders of magnitude slower than motion enabled by other reported actuators.

“This study offers deep insight into understanding the well-known hygroscopic deformation of the pine cone and other plant tissues capable of moving, but also into developing stimuli-responsive actuators that enable motion to proceed extremely slowly and unperceivably,” said Prof. Wang.

They envision such actuators enabling ultra-slow motion for use in various camouflage and reconnaissance applications, according to Prof. Liu.


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