

论文

甲虫前翅结构及其仿生研究进展

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摘要:

综述了近年来国内外有关甲虫前翅结构与仿生应用的研究成果及其发展前景。指出前翅是以小柱为中空层的框架式结构, 其左右前翅结合部分是一种巧妙的凹凸啮合结构; 前翅内存在着网状-小柱结构, 这是一种轻量型夹芯层状三明治结构; 小柱中的纤维与上下层中的纤维是连续的, 可有效增加叠层复合材料的抗剥离强度; 一些甲虫前翅的表面具有特殊的生物结构, 从而具有一些特殊的功能, 如具有减阻、集水或显色功能。结合生命科学的最新研究成果, 提出了通过基因组技术生产仿生材料的设想。

关键词: 甲虫前翅 轻量型结构 仿生 集水结构 显色功能

Progress in structural biomimetic research on forewing of beetles

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Abstract:

Research findings of the forewing structure of beetles and the development prospects of biomimetic applications were reviewed in this paper. The forewing is of frame structure with small columns as void lamination, and the coupling area of the left and right forewings is of the concave-convex meshing structure. The honeycomb-columniation structure, which exists in the forewing, is a kind of lightweight sandwich plate structure. The fibers between the columniation and the upper and lower layers of laminated composite material are continuous, which could effectively enhance the anti-stripping strength of the laminated composite materials. Special biological structures exist in the forewing surface of some beetles, leading to its special properties, such as drag-reduction, water capturing, and color development. A novel idea for producing biomimetic materials was proposed by designing vital genes.

Keywords: beetles forewing lightweight structure bionics water-collected structure color feature

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