蝴蝶鳞片微观结构与模型分析 Analysis of Microstructure and Model of Butterfly Scales

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关键词： 蝴蝶鳞片 结构色 非光滑 仿生 模型

摘 要： 蝴蝶鳞片表面具有脊沟等非光滑结构，这些结构的形态、密度、分布等的微小差别对光线产生折射、反射等光学效应使鳞片呈现不同的颜色。蝴蝶鳞片微观结构的分析是生物结构色隐身研究的理论基础。本文从宏观与微观、表面形态与横截面结构等角度出发，应用电镜对比分析了鳞片的微观结构，构建蝴蝶鳞片分布、形态和结构的优化模型，优化设计出2种仿蝴蝶鳞片微观结构模型。 There exist periodic order non-smooth structures like ridge and ditch in butterfly scales, small difference of which such as form, density, size, space, thickness, layer number, distribution style, can effect the different surface colors. The analysis on microstructure of butterfly scales is the theoretical foundation of stealth research on structural color of living creatures. From the macroscopical viewpoints and microcosmic ones of surface configuration and cross-section structure, the microstructure of scales were contrastively analyzed by electron microscope, the optimized model of distributing, configuration and structure of butterfly scales were built, and then two kinds of bionic models of butterfly scale’s microstructure were optimized and designed.

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