URN etd-0407109-183706-393
Author Ya-Wen Shih
Author's Email Address No Public.
Statistics This thesis had been viewed 47 times. Download 0 times.
Department
Year 2007
Semester 2
Degree Master
Type of Document Master's Thesis
Language zh-TW.Big5 Chinese
Title Fabrication and optical analysis of quasi structure with elytra from buprestid
Date of Defense 0000-00-00
Page Count 89

Keyword
Buprestid
photonic crystal
Polydimethylsiloxane
nano-reproduce

Abstract
The study investigates fabrication of quasi-structure with elytra from Buprestid, optical analysis of microstructure is also discussed. Six species of elytra of Buprestid are chosen to investigate various colors on the surface and cross-section of elytra. Optical microscopy (OM) and scanning electron microscopy (SEM) are also performed to observed microstructure and surface topography of elytra. Elytra of Buprestid has brilliant colors. Every Buprestid species comprised several colors. These colors may not only form by pigment by itself, but also caused form it microstructure. The results reveal that many hollow and hexagonal structures are arranged on surface. The diversity of diameter in hollow structure is quite large. Distribution from 9.65μm to 92.01μm and arrangement is random. On the contrary, the hexagonal array structure arranged regularly and the size are between 10μm to 15μm. Most contact angles are larger than 90 degree, and maximum cab reach to 106.2 degree. This means it has hydrophobic interaction. Cross-section of elytra comprises of cuticle-layer with thickness of 95nm~132nm and air-layer with thickness of 37nm~91nm. The main component of elytra are Carbon(C) and Oxygen(O) analyzed by ESCA, the ratio is 4：1 approximately. The reflection ratio of some wavelength is very high, and can be reached to 100%. The value of band gap calculated is 2.27eV.
In order to fabricate the quasi-structure of Buprestid, the position with largest reflections in elytra is decided to make replica process. The replica material used in this study is Polydimethylsiloxane (PDMS). The enlargement of replica compared to original size is 2.34%. Since PDMS is transparent, a layer of metal should be sputtered on its surface to measure optical characteristic, however the accuracy will be affected by the metal coated. The result assumes that Sternocera aquisignata, Chrysochroa rajah and Catoxantha opulenta may have one-dimensional photonic crystal structure. The fabrication of quasi-structure with elytra from Buprestid can promote the applications in the field of photonic structure and optical components.
Advisory Committee Tzu-Yao Tai - advisor

Files No Any Full Text File.
Date of Submission 2008-07-04