Structural Color of the Jewel Beetle

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Many insects including butterflies, moths, and beetles, show very brilliant colors that are produced by the microstructures in submicron size. These colors are called stuctural colors and many research works have been performed to clarify the mechanisms of the colorations and also to apply those colors to artificial products. Here, we report detailed optical studies of the jewel beetle, *Chrysochroa fulgidissima*, which is one of the most popular examples of the structural color (Fig. 1).

The electron microscopy has already revealed that there exists a multilayer stack beneath the surface of the elytron that consists of two kinds of materials having different electron densities (Fig. 2). This structure has been thought to be the origin of the coloration, since the thicknesses of the layers are suitable to cause the optical interference. Further, the color variation depending on the angle of observation (iridescence), which is one of the major characteristics of multiyear interference, is clearly noticed from green to blue as the observing direction becomes oblique.

However, the blue color observed at largely oblique angles does not look as strongly as the green color at small angles. This appearance seemingly contradicts one of the general properties of multilayer interference: reflectance becomes higher when the angle becomes oblique. This question may be answered when the refractive indices of the two constituent materials are determined. To this end, we have performed detailed optical measurements on the elytron of the jewel beetle.

Figure 1 Jewel beetle, *Chrysochroa fulgidissima*.

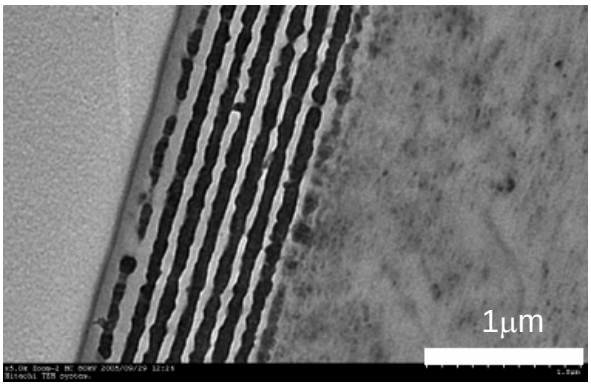

Figure 2 Electron micrograph of the cross section of elytron of the jewel beetle. The multilayer stack is clearly observed that consists of alternative dark and bright regions.