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Specular Reflection Structural Colors Effect for Nano Hole Array of Various Depth and by Light Source

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Extended Abstract

Colors have been presented generally through the selective absorption/emission of light by pigments or chromophores. However, colors are sometimes shown by physical effects including diffraction, scattering, and interference.[1] Such effects are often observed in the nature such as butterfly wings, opal, and peacock feathers. Over the last couple of years, sensors and displays imitating the nature have been reported a lot. Recently, in the nano-photonics area, new technologies to present structural colors have been studied on the basis of new concepts and technologies, among which the technology of making colors shown by the periodic array of the structure with less than micrometer has already been researched.[2,3] On the periodic sub-micrometer scale structure array, wavelengths of reflection are induced to the upper and lower parts of the structure by diffraction of light, and structural colors are shown by mutual interference. Also, it is known that when the transparent material is coated over the periodic sub-micrometer scale structure array, different structural colors are presented by thin film interference effect. However, it costs a lot to make a periodic sub-micrometer scale structures. In this paper presents specular structural colors on the randomly distributed nano holes structures which were prepared by cost effective process of aluminum anodization. In addition, influence of the depth of nano holes on the specular structural colors was studied through the aluminum anodizing process. Diameter of nano holes were about 143 nm to 161 nm, and pitch were about 204 nm to 225 nm. Depth were about 266 nm to 656 nm. The aluminum was deposited thickness of 10nm on the fabricated nano-hole array surface. The aluminum-deposited on the randomly nano-hole array substrate was observed specular structural colors for various light of daylight led, dayglow led, halogen lamp and white led. Specular structural color was expressed in a variety of colors depending on the depth of various nano holes and the light source. Light source of Halogen lamp was expressed of green and red tone colors. Another three light source was expressed of blue, green, navy and Violet tone colors. In this study randomly nano hole arrays of various of depth was confirmed that the expressed of various colors according to the light source.

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