Controlling Colour and Effective Refractive Index of Metal-Anodic Aluminium Oxide-Al Nanostructures: Morphology of AAO

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In the last years, the development of brilliant colours has produced immense interest to generate the colours found in nature. There are two approaches to perform artificially brilliant colours, chemical and physical. In the chemical coloration, pigments and/or dyes are used. The physical approach consists to metal-dielectric-metal nanostructures being environmentally friendly. In this case, the colour is due to the interaction of light with periodic nanostructures (anodic aluminium oxide). Metal-AOO-Al nanostructures can be used in different applications such as Surface Plasmon resonant, optical interference, wavelength absorbers, RGB display devices, optical sensors. In this study, metal-anodic aluminium oxide (AAO)-Al nanostructures were obtained by two steps, chromium thin films were deposited using sputtering system and self-ordered AAO films were fabricated using a two-step anodization process in different electrolytes in order to control the pore diameter, interpore distance and porosity[1]. The UV-Vis reflectance as function of the thickness for the different electrolytes of metal(Cr)-AAO-Al films was analysed in order to obtain the colour diagram of the films. The effective refractive index of AAO-Al films as function thickness, electrolyte, pore diameter, interpore distance and porosity (see Figure 1) was calculated from the UV-Vis reflectance. The aim of this work is to study the dependence of morphological parameters on the effective refractive index of AAO films [2].

References

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Figures

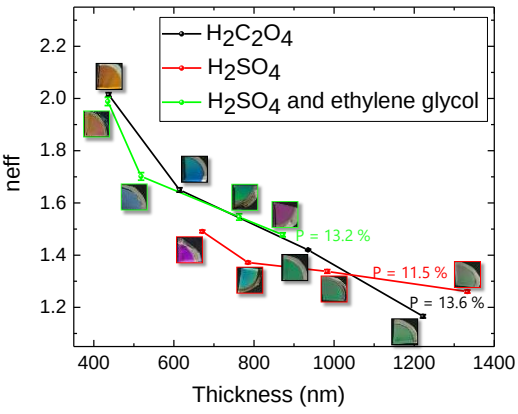

Figure 1: Effective refractive index as a function of the thickness for the different anodization conditions, and then different electrolytes. Colours of the metal-anodic aluminium oxide (AAO)-Al nanostructures.