Designing of nanoporous anodic alumina photonic structures and applications

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Nanoporous anodic alumina (NAA) has become an interesting material because of their outstanding set of properties, cost-competitive fabrication processes and fully scalable process compatible with conventional micro- and nanofabrication technology. NAA is obtained by the electrochemical etching of aluminum. [1-3]. Recently, different anodization and post-anodization treatments have been developed to create new structures and pore geometries such as modulated, funnel-like, serrated-like, tip-like, etc. The application of periodic variations of current or voltage during the anodization is transferred to the material as the periodic variation of the pore diameter and consequently, it is possible design, 1D, 2D and 3D structures. It is very interesting the design photonic structures (PS) with tunable stop bands within the UV-VIS-NIR range by applying cycling anodization processes [4-6]. Motivated for these excellent properties in this work, we present the recent advances of different photonic structures with different anodization approaches. Figure 1 shows an example of a sinusoidal current profile and involved parameters during the fabrication. Figure 1b shows the characteristic reflection spectrum of the Photonic structures. FESEM images shows the top view of the PS-NAA it is observed the nanopores distributed randomly on the surface of the sample (figure 1c) and the cross-section showing the pore modulation along the depth (inset).

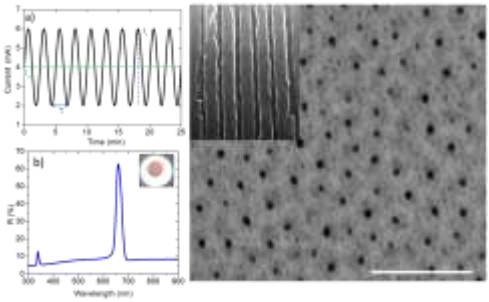

Figure 1. Sinusoidal anodization profile of Photonic Structures and involved anodization parameters. (b) Reflection spectrum of Photonic structures with sinusoidal anodization profile, (c) ESEM top view of the NAA-PS and ESEM cross-section of NAA-PS. Scale bar 1 µm.

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