$BaTiO_3$-TiO_2 nanotubesproduced by classical hydrothermal methodand their photoelectrochemical properties

N. Sobti[1], S.Kendouli[1], M.Baghriche[1] andS. Achour[2]

[1]Ceramic Laboratory, Faculty of exact science, University Constantine1, Algeria [2]Ecole Nationale Polytechnique de Constantine,Constantine, Algeria sobtinadjeh@yahoo.fr

Abstract

Nanotubes are of great interest due to their high surface-to-volume ratios and size-dependent properties. Titanium dioxide nanotube array is a well-known nanostructured semiconductor oxide with improved functional photocatalytic and sensing properties. Considering these properties, TiO_2 NTs arrays attract wide scientific interest in view of their applications in self-cleaned gas sensors, photo catalytic materials, dye sensitized solar cells, and water photo electrolysis. In this work, TiO_2 nanotubes were prepared by anodization of pure titanium sheets and subsequently covered with $BaTiO_3$ using classical hydrothermal method(200 °C during 2 hours). TheTiO_2 nanotubes were prepared using 2wt. %NH_4F in ethylene glycol and water under constant voltage 40 V for 4 hours. Thereafter, the prepared samples were hydrothermally processed in a solution of 0.004, 0.006,0.008M $Ba(HO)_2$respectively, and preheated distilled water in classical oven. Different techniques of analysis such as X-ray Diffraction (XRD), Raman Spectroscopyand Scanning Electron Microscopy (SEM) were used to characterize the obtained layers. The formation of $BaTiO_3$ was confirmed by Raman analysis. SEM image of these layers showed the coverage of TiO_2 nanotubes by $BaTiO_3$nano-particles.

Key words: TiO_2 nanotubes, anatase, rutile,$BaTiO_3$-TiO_2anodization,Hydrothermal method.