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Synthesis and Structure of Anodic Alumina/Carbon Composites

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Now alumina/carbon composites are used to purify waste water, as catalysts, and catalyst supports, due to their high sorption capacity and efficiency together as well as low cost [1, 2]. In the present study we investigated the peculiarities of synthesis of anodic alumina/carbon composites through one-stage electrochemical oxidation of the aluminum foil in aqueous solutions of oxalic, malonic, glycolic, and tartaric acids. We also explored the chemical composition of the composites.

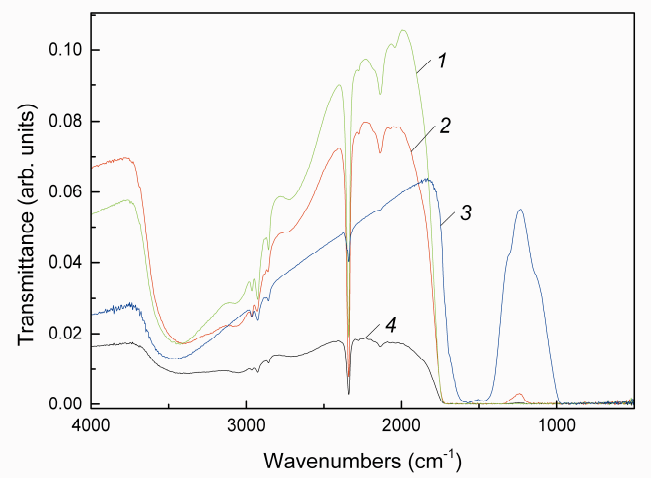

Fig. 1. FTIR spectra of the anodic alumina/carbon composites formed in the aqueous solutions of glycolic (1), malonic (2), oxalic (3), and tartaric (4) acids.

The samples were obtained by double-sided anodizing of the high-purity aluminum foil (99.99 wt. %, 100 μm thick, 15 × 15 mm, AlfaAesar) in aqueous solutions of 0.3 M oxalic, 0.8 M malonic, 1.0 M glycolic, and 0.4 M tartaric acids in a constant current density mode up to the moment when the aluminum was completely oxidized. Surface morphology was analyzed by scanning electron microscopy (SEM) on a LEO 1402 (Leo Electron microscope). The chemical composition of the films was characterized by Fourier transform infrared (FTIR) spectroscopy using a Vertex 70 (Bruker) FTIR spectrometer.

According to the FTIR studies, all samples in addition to alumina (1200–500 cm–1) contain chemisorbed hydroxyl groups (3700–3200 cm–1), and carbon-bearing components, such as CO2 (ca. 2340 cm–1), CO (ca. 2137 cm–1), COO– and CO32– ions (1750–1250 cm–1), and amorphous carbon (3200–2850 cm–1). The variety of products indicates that ions of organic acids are oxidized during aluminum anodizing.

REFERNCES

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