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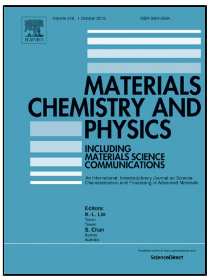

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IR and Py-GC/MS investigation of composite PTFE/PEO coatings on aluminum

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The data on the composition of polytetrafluoroethylene (PTFE) + Al_2O_3 coatings obtained on an aluminum alloy by the single-stage method of plasma electrolytic oxidation (PEO) are presented. The coatings are formed in an alkaline silicate electrolyte with introduction of dispersed PTFE particles stabilized with siloxane–acrylate emulsion. The comparative study of the surface of initial oxide and PTFE/Al_2O_3 coatings, dispersed PTFE powder, and dry emulsion residue has been performed by the method of IR spectroscopy. The method of pyrolytic chromatography – mass spectrometry was used to obtain the data on the composition of the emulsion dry residue, dispersed PTFE powder, and PTFE/Al_2O_3-coatings. The surface and the main bulk of compact polymer-like PTFE/ Al_2O_3 coatings do not contain aluminum and silicon oxides. They consist of the products of destruction of emulsion and PTFE formed under effect of electric discharges during PEO and contain PTFE particles in pores and caverns.

Key words: PTFE/Al_2O_3-coatings; aluminum; plasma electrolytic oxidation; IR spectroscopy; pyrolytic chromatography – mass spectrometry.

1. Introduction

A rather substantial attention of researchers is focused on fabrication and study of hybrid coatings, i.e., those containing, aside from the oxide component, compounds of the nature similar to that of organics, such as graphite, graphenes, polymers, and carbon nanotubes and nanofibers [1-6]. Introduction of the above fillers can impart coatings with new properties. In particular, introduction of polytetrafluoroethylene ($[-C_2F_4-]_n$, PTFE) results in the decrease of the friction coefficient and the increase of anticorrosion and hydrophobic parameters of the final composites [6-13].