



Iranian Journal of Physics Research, Vol. 18, No. 2, 2018

Research note

The study of the effect of the material and distance of the substrate on the characteristics of the alumina nanopowder coating using the plasma spray method

M Kouhi, A R Sotoudeh Khiaban and S Sobhanian

Department of Physics, Tabriz Branch, Islamic Azad University, Tabriz, Iran

E-mail: Kouhi@iaut.ac.ir

(Received 15 December 2017 ; in final form 07 January 2018)

Abstract

In this paper, the effects of the material and distance of the substrate on the characteristics of gamma alumina nanopowder coated by the plasma spray method are investigated. For this purpose, alumina nanopowder are coated on two types of stainless steel and pyrex glass substrates using a plasma torch. Morphological characteristics of the prepared nanolayer are studied by investigating the scanning electron microscope patterns. Also, the structure and phase changes of the deposited alumina are investigated by the X-ray diffraction spectrum. The results of this study show that the amount of particles deposited on the steel substrate is more than that of the glass case. Also, it is shown that by increasing the substrate distance, the amount of particles deposition is decreased for the substrates. There is one optimum distance for the substrate position with respect to the nozzle exit of the torch for producing the suitable coating and its control. One important result of this experimental study is the phase transfer of alumina from gamma to alpha due to the high temperature of the plasma torch.

Keywords: plasma spray, alumina, coating, phase transition, x ray diffraction

For full article, refer to the Persian section