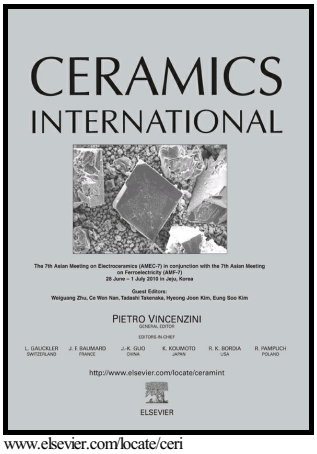


www.elsevier.com/locate/ceri

# Structure and electrical insulation characteristics of plasma-sprayed alumina coatings under pressure

Rongrong Luo, Pengyuan Li, Haihong Wei, Hui Chen, Kun Yang

PII: S0272-8842(17)32924-3
DOI: https://doi.org/10.1016/j.ceramint.2017.12.216
Reference: CERI17096

To appear in: *Ceramics International*

Received date: 2 December 2017
Revised date: 28 December 2017
Accepted date: 28 December 2017

Cite this article as: Rongrong Luo, Pengyuan Li, Haihong Wei, Hui Chen and Kun Yang, Structure and electrical insulation characteristics of plasma-sprayed alumina coatings under pressure, *Ceramics International,* https://doi.org/10.1016/j.ceramint.2017.12.216

# Structure and electrical insulation characteristics of plasma-sprayed alumina coatings under pressure

Rongrong Luo[1*], Pengyuan Li[1], Haihong Wei[1], Hui Chen[1], Kun Yang[2]

[1]Southwestern Institute of Physics, Chengdu 610041, China

[2]Guangzhou Research Institute of Nonferrous Metals, Guangzhou 510650, China

[*]Corresponding author: luorr@swip.ac.cn

## Abstract

In this work, alumina coatings were fabricated on 316LN austenitic stainless steel by a plasma spray technique. The pressure dependence of the surface electrical resistivity of alumina coatings was investigated in detail. A combination of scanning electron microscopy and X-ray diffraction was employed to understand the microstructure and properties of the as-sprayed alumina coatings. The coatings can endure high pressures under a practical working environment. The surface electrical resistivity of the alumina coatings decreases continuously with an increase in pressure to 250 MPa. Interestingly, the surface resistivity is still greater than $10^7\ \Omega\cdot$mm for 250 MPa, demonstrating that the coatings have good electrical insulation properties and can be fully utilized in the magnet support of ITER.

Keywords: Alumina coatings; Surface resistivity; Crystal structure; X-ray techniques

## 1 Introduction

Conductors can give rise to a large eddy current in International Thermonuclear Experimental Reactor (ITER) magnet supports due to the presence of self-resistance. The insulation coatings can withstand the high force, strong magnetic field and cryogenic temperature that occur during operation, so outstanding electrical insulation