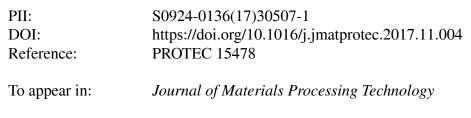
Accepted Manuscript

Title: Alumina-Titanium Functionally Graded Composites produced by Spark Plasma Sintering

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 Received date:
 19-7-2017

 Revised date:
 13-10-2017

 Accepted date:
 3-11-2017

Please cite this article as: Madec, Clémentine, Gallet, Sophie L.E., Salesse, Bruno, Geoffroy, Nicolas, Bernard, Frédéric, Alumina-Titanium Functionally Graded Composites produced by Spark Plasma Sintering.Journal of Materials Processing Technology https://doi.org/10.1016/j.jmatprotec.2017.11.004

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ACCEPTED MANUSCRIPT

Alumina-Titanium Functionally Graded Composites produced by Spark Plasma Sintering

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Abstract

The joining conditions of alumina (Al₂O₃) and titanium (Ti) were studied to produce relatively light materials combining a high hardness and ductility at ambient temperature. The starting Al₂O₃ and Ti in the form of powders were sintered by spark plasma sintering (SPS). The joining required Al₂O₃/Ti composite interlayers. Ti, Al₂O₃ and composites were separately sintered and characterized in terms of their microstructure and mechanical properties. Tensile tests were performed to evaluate the ductility of titanium. Hardness and toughness were estimated from indentation tests of alumina and composites. Ti that was SPSsintered in the same conditions as Al₂O₃, did not show the expected properties (absence of ductility) due to the formation of carbides and oxides. Al₂O₃, with its refined microstructure, was particularly hard. Regardless of their composition, composites were found to be more cracking resistant than pure Al₂O₃, despite the reactivity of titanium with alumina. The Download English Version:

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