

Fabrication and characterization of SS316L–Al₂O₃ composites for wear applications. / C. Kuforiji, M. Nganbe. / Nano Studies. – 2015. – # 11. – pp. 11-18. – eng.

The low cost and excellent mechanical properties of steel and alumina make them outstanding candidates for fabricating composites for highly demanding wear applications. Therefore, SS316L–Al₂O₃ composites were fabricated using mechanical alloying and powder metallurgy. The microstructure, hardness and abrasive wear behavior were investigated. The final composites consisted of 1 – 3 μm alumina particles homogeneously dispersed in the SS316L matrix. The porosity, hardness and wear rate were 5.3 vol. %, 1085 HV and 0.004 mm³/m, respectively. Compared to SS316L reference steel, the composites showed 9 times increase in hardness and 7.3 times decrease in wear rate. However, they exhibited 5.7 times higher wear rate compared to WC–Co due to lower ceramic content and higher porosity. Improved densification using hot isostatic pressing may result in substantial further improvement. It is concluded that the addition of Al₂O₃ particles, together with optimized powder metallurgy processing can produce low cost steel based composites with excellent wear resistance. Fig. 7, Tab. 1, Ref. 15.

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