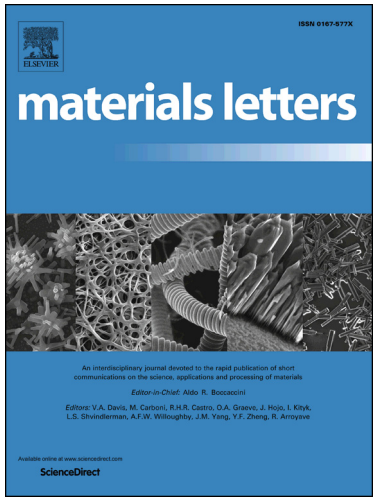

Microstructural and mechanical properties of in-situ micro-laminated TiC/Ti composite synthesised

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Microstructural and mechanical properties of in-situ micro-laminated TiC/Ti composite synthesised

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Abstract: Micro-laminated TiC/Ti composite was fabricated by an in-situ method that evolves hot-pressing sintering Ti and graphite foils. The microstructure and mechanical properties of micro-laminated TiC/Ti composite were investigated in present work. It was observed that the TiC ceramic layers and the Ti layers were alternately distributed after sintering. The micro-laminated TiC/Ti composite exhibited flexural strength of 690±30 MPa and fracture toughness of 24.78±0.71 MPa*$m^{1/2}$ which are much higher than those of traditional TiC ceramics and cermets. The improved fracture toughness attributes to ductile Ti layers, multiple-layers structure and strong interfaces bonding between Ti and in-situ formed TiC layers. In addition, the method used in this study was much simpler and more cost-effective than traditional powder sintering method for fabricating micro-laminated composite, therefore, is promising for real application.

Keywords: micro-laminated composite; in-situ method; fracture toughness; biomimetic; multilayer structure

1. Introduction

Titanium carbide (TiC) ceramics have wide applications on surface coating, titanium matrix composites, and nuclear reactor, attributing to their high hardness,

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