

## Accepted Manuscript

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

Youde Tan, Hongnian Cai, Xingwang Cheng, Zhaolong Ma, Ziqi Xu, Zhifang Zhou

PII: S0167-577X(18)30824-3  
DOI: <https://doi.org/10.1016/j.matlet.2018.05.069>  
Reference: MLBLUE 24369

To appear in: *Materials Letters*

Received Date: 26 March 2018  
Revised Date: 6 May 2018  
Accepted Date: 14 May 2018

Please cite this article as: Y. Tan, H. Cai, X. Cheng, Z. Ma, Z. Xu, Z. Zhou, Microstructural and mechanical properties of in-situ micro-laminated TiC/Ti composite synthesised, *Materials Letters* (2018), doi: <https://doi.org/10.1016/j.matlet.2018.05.069>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



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

Youde Tan<sup>a,b</sup>, Hongnian Cai<sup>a,b</sup>, Xingwang Cheng<sup>a,b\*</sup>, Zhaolong Ma<sup>a,b</sup>, Ziqi Xu<sup>a,b</sup>, Zhifang Zhou<sup>c</sup>

<sup>a</sup>School of Materials Science and Engineering, Beijing Institute of Technology, Beijing 100081, China

<sup>b</sup>National Key Laboratory of Science and Technology on Materials under Shock and Impact, Beijing 100081, China

<sup>c</sup>State Key Laboratory of New Ceramics and Fine Processing, School of Materials Science and Engineering, Tsinghua University, Beijing 100084, China.

**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  $690\pm 30$  MPa and fracture toughness of  $24.78\pm 0.71$  MPa $\cdot$ m<sup>1/2</sup> 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,

---

\*Corresponding author. School of Materials Science and Engineering, Beijing Institute of Technology, Beijing 100081, China.

E-mail address: chengxw@bit.edu.cn (X. Cheng).

Download English Version:

<https://daneshyari.com/en/article/8012480>

Download Persian Version:

<https://daneshyari.com/article/8012480>

[Daneshyari.com](https://daneshyari.com)