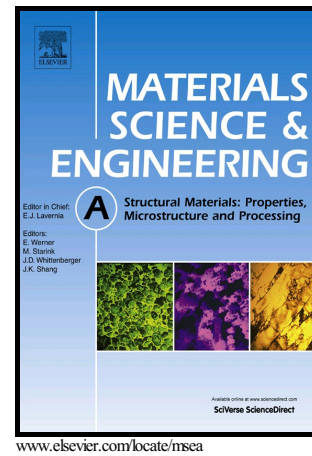


## Author's Accepted Manuscript

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PII: S0921-5093(18)30274-0  
DOI: <https://doi.org/10.1016/j.msea.2018.02.065>  
Reference: MSA36152

To appear in: *Materials Science & Engineering A*

Received date: 3 November 2017  
Revised date: 27 December 2017  
Accepted date: 16 February 2018

Cite this article as: Zheng-Yang Hu, Zhao-Hui Zhang, Hu Wang, Sheng-Lin Li, Shi-pan Yin, Qi Song and Xing-Wang Cheng, A rapid route for synthesizing Ti-(Al<sub>x</sub>Ti<sub>y</sub>/UFG Al) core-multishell structured particles reinforced Al matrix composite with promising mechanical properties, *Materials Science & Engineering A*, <https://doi.org/10.1016/j.msea.2018.02.065>

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# A rapid route for synthesizing Ti-(Al<sub>x</sub>Ti<sub>y</sub>/UFG Al) core-multishell structured particles reinforced Al matrix composite with promising mechanical properties

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## Abstract:

A new type of Al-matrix composites reinforced by in-situ Ti-(Al<sub>x</sub>Ti<sub>y</sub>/Ultrafine-grained Al) core-multishell structured particles were successfully fabricated at relatively low temperature (450 to 580°C) by SPS technique within a very short time. The composite sintered at 580 °C exhibits a yield strength improvement of 64.5% over the unreinforced matrix and a satisfactory elongation of 27%. The defects, UFG-Al grains and local-connection accelerated the Al-Ti inter-diffusion and consolidation process of composites. Although residual voids near Al<sub>x</sub>Ti<sub>y</sub>/Al interface may induce the cracks, discontinuous tough intermetallic-phases inside Al<sub>x</sub>Ti<sub>y</sub> layer and soft Ti-core can effectively decelerate the crack-propagation.

**Keywords:** Al matrix; Core-multishell structure; Ultrafine-grained Al-grains; Tensile property

Al and its alloys strengthened by dispersoids of intermetallic compounds are of significant commercial importance in automotive and construction industries due to their great weight reduction potential, mechanical and corrosion properties. Moreover, TiAl-based intermetallics possess an

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