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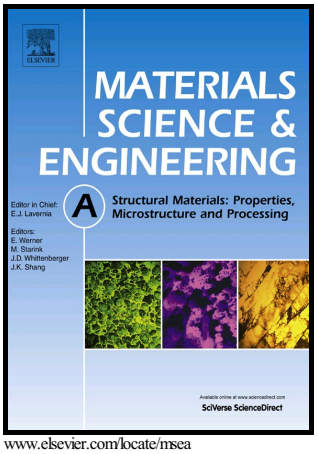

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Effectively reinforced load transfer and fracture elongation by forming Al_4C_3 for *in-situ* synthesizing carbon nanotube reinforced Al matrix composites

Xinghai Liu[a], Jiajun Li[a], Enzuo Liu[a,b], Qunying Li[a], Chunnian He[a,b*], Chunsheng Shi[a], Naiqin Zhao[a,b*]

[a]School of Materials Science and Engineering and Tianjin Key Laboratory of Composites and Functional Materials, Tianjin University, Tianjin 300350, China

[b]Collaborative Innovation Center of Chemical Science and Engineering, Tianjin 300072, China

[*]Corresponding author.

cnhe08@tju.edu.cn

nqzhao@ tju.edu.cn

Abstract:

This work presents an *in-situ* chemical vapor deposition (CVD) method to synthesis carbon nanotube (CNT) on Al powders in a vertical tube furnace. The carbon nanotube reinforced Al matrix composites (CNT/Al composites) were fabricated by a new powder metallurgy (PM) approach associated with vacuum induction melting technique. It was shown that CNT was homogenously distributed in the Al matrix, and an interfacial transiting layer of Al_4C_3 was formed between Al matrix and CNT in the bulk material. The tensile test showed that 1.5 vol % CNT/Al composites exhibited the largest tensile strength of 191 MPa as well as an excellent elongation of 32.6 %. The strengthening efficiency of the 1.5 vol % CNT/Al composites improved by ~ 80 % compared to the unreinforced pure Al. The strengthening mechanisms were mainly attributed to the load transfer of CNT, Al_4C_3 and dislocation strengthening. The Al_4C_3 transiting layer was beneficial