Accepted Manuscript

Improved microwave absorbing property provided by the filler's alternating lamellar distribution of carbon nanotube/ carbonyl iron/ poly (vinyl chloride) composites

Yuan Gao, Xiaoyan Gao, Jiang Li, Shaoyun Guo

PII: S0266-3538(17)32004-3

DOI: 10.1016/j.compscitech.2017.11.029

Reference: CSTE 6984

To appear in: *Composites Science and Technology*

Received Date: 15 August 2017

Revised Date: 24 November 2017

Accepted Date: 27 November 2017

Please cite this article as: Gao Y, Gao X, Li J, Guo S, Improved microwave absorbing property provided by the filler's alternating lamellar distribution of carbon nanotube/ carbonyl iron/ poly (vinyl chloride) composites, *Composites Science and Technology* (2017), doi: 10.1016/j.compscitech.2017.11.029.

Improved microwave absorbing property provided by the filler's alternating lamellar distribution of carbon nanotube/ carbonyl iron/ poly (vinyl chloride) composites

Yuan Gao, Xiaoyan Gao, Jiang Li*, Shaoyun Guo

(The State Key Laboratory of Polymer Materials Engineering, Polymer Research Institute of Sichuan University, Chengdu, Sichuan, 610065, China)

* Corresponding Author: Jiang Li

Tel.: +86-28-85466077; Fax: +86-28-85466077; E-mail: li_jiang@scu.edu.cn

Abstract

The microwave absorbing properties of composites with filler's uniform and selective distribution were comparatively investigated. The calculated and experimental results demonstrated that, compared with the uniform distribution, filler's selectively alternating lamellar distribution was more effective in decreasing the minimum reflection loss (RL-min) and broadening the effective bandwidth (EB, RL<-10dB, for 90% microwave absorption). For examples, for the normal blending samples 3#, the multi-layer structure decreased the RL-min from -21.0 to -48.1 dB, broadened the EB from 2.9 to 5.0 GHz. The layer number, filler content and layer arranging sequence also have strong effects on the microwave absorbing properties. The mechanism behind these effects was the competition between two effects (transmission blocking and attenuation enhancement) provided by the multi-layer structure. The matching frequency could be adjusted by changing the layer number rather the sample thickness. This study provided a facile way to construct a filler's selective distribution morphology, and a more effective method to combine different absorbents, which could be applicable in the designing and fabricating of high-efficient structural microwave absorbing materials.

Keywords: Carbon nanotubes; Polymer; Functional composites; Layered structures;