

Accepted Manuscript

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PII: S1359-835X(17)30443-8

DOI: <https://doi.org/10.1016/j.compositesa.2017.12.009>

Reference: JCOMA 4858

To appear in: *Composites: Part A*

Received Date: 25 September 2017

Revised Date: 8 December 2017

Accepted Date: 9 December 2017



Please cite this article as: Luan, Y., Gao, F., Li, Y., Yang, J., Hu, Y., Guo, Z., Wang, Z., Zhou, A., Healing Mechanisms Induced by Synergy of Graphene-CNTs and Microwave Focusing Effect for the Thermoplastic Polyurethane Composites, *Composites: Part A* (2017), doi: <https://doi.org/10.1016/j.compositesa.2017.12.009>

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Healing Mechanisms Induced by Synergy of Graphene-CNTs and Microwave Focusing Effect for the Thermoplastic Polyurethane Composites

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ABSTRACT: Healing is a vital factor of polymer materials. Herein, an investigation on the healing performance of Graphene-CNTs reinforced thermoplastic polyurethane (TPU) composites induced by microwave was carried out. The results show that the graphene sheet and CNTs formed a combined structure of Graphene-CNTs. This Graphene-CNTs may have a synergy effect on the coupling between microwave and Graphene-CNTs on the interface, and promote the fully healing of damaged composites. The tensile strength of the healed composites even exceeds the value of the virgin specimens. Simultaneously, there is a microwave focusing effect within the region of crack, and on the surfaces of graphene or CNTs that exposed on the fracture surfaces. This effect will also promote the healing of damaged composites, and can realize the preferential healing of crack as compared with the non-damaged regions. These results may help us to get a deeper understanding

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