

# Accepted Manuscript

Facile fabrication of POSS-Modified MoS<sub>2</sub>/PMMA nanocomposites with enhanced thermal, mechanical and optical limiting properties

Qiaobo Liao, Qi Zhang, Xuelin Wang, Xinle Li, Guoqing Deng, Zhen Meng, Kai Xi, Peng Zhan

PII: S0266-3538(17)32230-3

DOI: [10.1016/j.compscitech.2018.07.008](https://doi.org/10.1016/j.compscitech.2018.07.008)

Reference: CSTE 7294

To appear in: *Composites Science and Technology*

Received Date: 5 September 2017

Revised Date: 15 May 2018

Accepted Date: 3 July 2018

Please cite this article as: Liao Q, Zhang Q, Wang X, Li X, Deng G, Meng Z, Xi K, Zhan P, Facile fabrication of POSS-Modified MoS<sub>2</sub>/PMMA nanocomposites with enhanced thermal, mechanical and optical limiting properties, *Composites Science and Technology* (2018), doi: 10.1016/j.compscitech.2018.07.008.

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.



# Facile Fabrication of POSS-Modified MoS<sub>2</sub>/PMMA Nanocomposites with Enhanced Thermal, Mechanical and Optical Limiting Properties

Qiaobo Liao<sup>1</sup>, Qi Zhang<sup>1</sup>, Xuelin Wang<sup>2</sup>, Xinle Li<sup>3</sup>, Guoqing Deng<sup>1</sup>, Zhen Meng<sup>1</sup>, Kai Xi<sup>1\*</sup> and Peng Zhan<sup>2\*</sup>

1. Department of Polymer Science & Engineering, School of Chemistry and Chemical Engineering, Nanjing University, Nanjing 210023, P.R. China.
2. School of Physics and National Laboratory of Solid State Microstructure, Nanjing University, Nanjing 210093, P.R. China.
3. Department of Chemistry, Iowa State University, Ames, Iowa 50011, United States.

\* E-mail: xikai@nju.edu.cn; zhanpeng@nju.edu.cn

## Abstract:

A facile strategy was applied to transfer chemically exfoliated molybdenum disulphide (MoS<sub>2</sub>) nanosheets from aqueous medium to organic solvents. The MoS<sub>2</sub> nanosheets were then modified by trisilanol-phenyl-POSS (T<sub>7</sub>POSS) which was confirmed by Fourier transform infrared (FT-IR), X-ray photoelectron spectroscopy (XPS) and Powder X-Ray Diffraction (PXRD). The modified MoS<sub>2</sub> nanosheets were then incorporated into poly (methyl methacrylate) (PMMA) via a simple solution blending method. The Scanning Electron Microscope (SEM) and ~~Powder X-Ray Diffraction (PXRD)~~ Transmission electron microscope (TEM) were employed to demonstrate the well-dispersion of nanosheets in polymeric matrix. Compared to neat PMMA, the decomposition temperatures ( $T_d$ ) and the half weight decomposition temperatures ( $T_{half}$ ) of POSS-MoS<sub>2</sub>/PMMA nanocomposites at nanosheets concentration of 0.2 wt% were dramatically increased by 35.2 °C and 35.3 °C, respectively, ~~when the content of nanosheets reached only 0.2 wt%. Meanwhile, according to the measurements of Dynamic Mechanical Analysis (DMA), the storage modulus at 30 °C and glass transition temperature ( $T_g$ ) were significantly improved by 5.2 times and 6.2 °C, respectively.~~ Meanwhile, according to the measurements of Dynamic Mechanical Analysis (DMA), the storage modulus at 30 °C ~~was~~ is significantly improved by 5.2 times and the glass transition temperature ( $T_g$ ) ~~was~~ is also enhanced by 6.2°C. Remarkably, POSS-MoS<sub>2</sub>/PMMA nanocomposites possess low optical limiting differential transmittance  $T_c$  (0.5 %), low nonlinear optical absorption onset threshold  $F_{ON}$  (0.02 J·cm<sup>-2</sup>), low optical limiting threshold  $F_{OL}$  (0.4 J·cm<sup>-2</sup>) and high nonlinear coefficient  $\beta$  (297 cm·GW<sup>-1</sup>), highlighting their vast

Download English Version:

<https://daneshyari.com/en/article/7214174>

Download Persian Version:

<https://daneshyari.com/article/7214174>

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