

Accepted Manuscript

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PII: S1359-8368(17)34303-2

DOI: [10.1016/j.compositesb.2018.04.013](https://doi.org/10.1016/j.compositesb.2018.04.013)

Reference: JCOMB 5621

To appear in: *Composites Part B*

Received Date: 28 December 2017

Revised Date: 27 March 2018

Accepted Date: 5 April 2018

Please cite this article as: Raji M, Mekhzoum MEM, Rodrigue D, Qaiss AEK, Bouhfid R, Effect of silane functionalization on properties of polypropylene/clay nanocomposites, *Composites Part B* (2018), doi: 10.1016/j.compositesb.2018.04.013.

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Effect of silane functionalization on properties of polypropylene/clay nanocomposites

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ABSTRACT

Polypropylene (PP)/clay nanocomposites were prepared by melt compounding with different grafted clay, such as montmorillonite, halloysite and sepiolite. These clays organically modified by grafting of two organosilanes namely 3-aminopropyltriethoxysilane (APTES) and vinyltrimethoxysilane (VTMS) were used as nanofillers for PP at different concentration (1-5 wt.%). The physico-chemical properties of organosilane-modified clay-type were examined by various structural, thermal and morphological analysis routs. According to experimental data, all clays were successfully intercalated using the silane molecules approved by the decline of the clay nano-particles size, modification of their chemical composition and the increase of their *d-spacing*. The efficiency of the silylation process as a good way to improve the matrix-fillers interaction was demonstrated by comparing the mechanical characteristics of the clays nanocomposites before and after grafting with organosilanes. Morphological and rheological properties of the PP/clay nanocomposites were also investigated in detail. In conclusion, it was found that the addition of the nano-organoclay allows improving the proprieties of silane grafted clays nanocomposites, which can endorse better interfacial adhesion between the organoclay and the polypropylene and their great spatial dispersion-distribution. The resulting PP/organosilane-grafted clay nanocomposites could be used by industry, or possible fields of application including automotive and construction industries.

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