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## Study the effects of an addition of titanium dioxide (TiO<sub>2</sub>) on the mechanical and thermal properties of polypropylene-rice husk green composites

By: [Awang, M](#) (Awang, Mohamad)<sup>[1]</sup>; [Mohd, WRW](#) (Mohd, Wan Roslina Wan)<sup>[1]</sup>; [Sarifuddin, N](#) (Sarifuddin, Norshahida)<sup>[2]</sup>

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### Abstract

New composites based on polypropylene as polymer matrix reinforced rice husk have been developed. The improvement of mechanical and thermal properties can be achieved by the addition of inorganic filler namely titanium dioxide (TiO<sub>2</sub>). In this work, two series of composites formulation of polypropylene reinforced rice husk with and without TiO<sub>2</sub> incorporation were prepared. The composite was firstly melt compounding with a twin screw extruder and then were injection molded. Mechanical tests were applied to obtain tensile strength, Young's modulus and elongation at break. Morphology of fractured surface of the composites also was observed using Scanning Electron Microscope as well as thermal properties was analyzed by Thermogravimetric Analysis (TGA). The results showed that the composites with an inclusion of inorganic filler TiO<sub>2</sub> gave better mechanical properties than the composites without inclusion of TiO<sub>2</sub> and pure PP. The maximum value of tensile strength which was 41.2 MPa represented by the composites formulation of PP/RH-10 wt%/TiO<sub>2</sub>. Generally, Young's modulus of PP/RH-40 wt%/TiO<sub>2</sub> composites showed increment which was 1086.16 MPa and 635.48 MPa higher than that of pure PP and PP/RH. Elongation at break decreased in PP/RH/TiO<sub>2</sub> as compared to PP/RH composites. Scanning electron microscope (SEM) micrographs show improved interaction between RH and PP matrix by having a good interfacial adhesion as a result of TiO<sub>2</sub> inclusion in PP/RH composites. Thermogravimetric analysis (TGA) indicated that thermal stability of PP/RH/TiO<sub>2</sub> composite was increased as compared to pure PP and PP/RH composites. Incorporation of inorganic filler TiO<sub>2</sub> into PP/RH significantly enhanced mechanical properties and thermal stabilities of the green hybrid PP/RH/TiO<sub>2</sub> composites.

### Keywords

Author Keywords: polypropylene; rice husk; titanium dioxide; green composite

KeyWords Plus: COMPATIBILIZING AGENTS; COUPLING AGENT; PP COMPOSITES; FLOUR; FIBER; FILLER; SILANE

### Author Information

Reprint Address: Mohd, WRW (reprint author)

+ Univ Malaysia Terengganu, Sch Ocean Engn, Kuala Nerus 21030, Terengganu, Malaysia.

### Addresses:

+ [ 1 ] Univ Malaysia Terengganu, Sch Ocean Engn, Kuala Nerus 21030, Terengganu, Malaysia

+ [ 2 ] IIUM, Dept Mfg &amp; Mat Engn, Kulliyyah Engn, Jalan Gombak, Kuala Lumpur 53100, Selangor, Malaysia

E-mail Addresses: [wroslinamohd@gmail.com](mailto:wroslinamohd@gmail.com)

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