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Study the effects of an addition of titanium dioxide (TiO_2) on the mechanical and thermal properties of polypropylene-rice husk green composites (Article)

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Abstract

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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_2). In this work, two series of composites formulation of polypropylene reinforced rice husk with and without TiO_2 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_2 gave better mechanical properties than the composites without inclusion of TiO_2 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_2. Generally, Young's modulus of PP/RH-40 wt%/TiO_2 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_2 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_2 inclusion in PP/RH composites. Thermogravimetric analysis (TGA) indicated that thermal stability of PP/RH/TiO_2 composite was increased as compared to pure PP and PP/RH composites. Incorporation of inorganic filler TiO_2 into PP/RH significantly enhanced mechanical properties and thermal stabilities of the green hybrid PP/RH/TiO_2 composites. © 2019 IOP Publishing Ltd.

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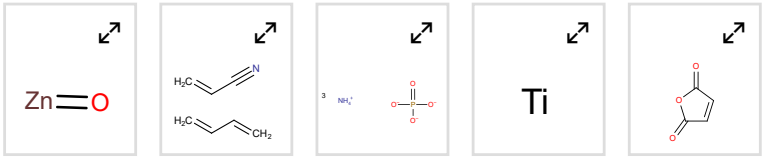

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Author keywords

green composite | polypropylene | rice husk | titanium dioxide

Indexed keywords

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Engineering uncontrolled terms: Elongation at break | Fractured surfaces | Green composites | Interfacial adhesions | Mechanical and thermal properties | Rice husk | Titanium dioxides (TiO2) | Twin screw extruders

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References (41)

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1 Rezaei, F., Yunus, R., Ibrahim, N.A.
Effect of fiber length on thermomechanical properties of short carbon fiber reinforced polypropylene composites
(2009) *Materials and Design*, 30 (2), pp. 260-263. Cited 231 times.
doi: 10.1016/j.matdes.2008.05.005
View at Publisher

2 Yu, M., Huang, R., He, C., Wu, Q., Zhao, X.
Hybrid Composites from Wheat Straw, Inorganic Filler, and Recycled Polypropylene: Morphology and Mechanical and Thermal Expansion Performance (Open Access)
(2016) *International Journal of Polymer Science*, 2016, art. no. 2520670. Cited 12 times.
http://www.hindawi.com/journals/ijps/
doi: 10.1155/2016/2520670
View at Publisher

3 Khademieslam, H., Kalagar, M.
Evaluation of the bending strength, impact strength, and morphological properties of wheat straw fiber/paper mill sludge/polypropylene composites (Open Access)
(2016) *BioResources*, 11 (2), pp. 3914-3922. Cited 4 times.
https://www.ncsu.edu/bioresources/BioRes_11/BioRes_11_2_3914_Eslam_K_Eval_Bending_Impact_Streng_Morph_Prop_Wheat_St_PP_Compos_9109.pdf
doi: 10.15376/biores.11.2.3914-3922
View at Publisher

Aydemir, D. , Uzun, G. , Gumuş, H.
(2016) Medziagotyra
Rice husk and its composites: Effects of rice husk loading, size, coupling agents, and surface treatment on composites' mechanical, physical, and functional properties
Bilal, A. , Lin, R.J.T. , Jayaraman, K.
(2017) Handbook of Composites from Renewable Materials
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