**MECHANICAL PROPERTIES OF HYDROTHERMALLY GROWN CARBON REINFORCED POLYPROPYLENE COMPOSITES**

**Nurettin ELTUĞRAL**

 **Engineering Faculty, Medical Engineering Department, Karabuk University, Karabük, Türkiye**

 **0000-0001-6393-9611**



|  |
| --- |
| **ABSTRACT** This study reports mechanical properties of composites produced by adding certain amounts (10, 15 and 20 wt%) of hydrothermall grown carbon spheres (HTCs) into polypropylene (PP) were investigated. Composites were prepared by means of melt-mixing method [1]. PP is a very promising material which serves as a useful matrix for reinforcing to produce composites with improved mechanical properties to enlarge its applications [2–4]. Reinfrocements are used to tune and improve mainly physical and mechanical properties of plastics [5–7]. HTCs of different compositions as the reinforcement was was studied to explore the effects of loading rates. Scanning electron microscopy (SEM) was employed to study morphological and structural properties of the obtained composites. Thermal stabilities of the composites were studied by thermogravimetric analsysis under nitrogen atmosphere. Mechanical properties of the composited were evaluated by means of tensile tests. Although, PP/HTC composites yielded lower tensile strength compared to pristine PP, they showed improved performance as the HTC content increased, their performance increase as more HTC was added. Addition of HTC caused a remarkable reduction in elongation of PP. Thermal stabilities of the composites were found to be higher than that of pristine PP. MFI values of the composites were shown to increase as more HTC added. This study could be assessed as a means of useful data for future applications of HTC as potential filler in polymer science and technology.**References:** [1] Wang J, Song F, Ding Y, Shao M. The incorporation of graphene to enhance mechanical properties of polypropylene self-reinforced polymer composites. Mater Des 2020;195:109073.[2] Menyhárd A, Varga J. The effect of compatibilizers on the crystallisation, melting and polymorphic composition of β-nucleated isotactic polypropylene and polyamide 6 blends. Eur Polym J 2006;42:3257–68.[3] Martínez-Colunga JG, Sánchez-Valdés S, Ramos-Devalle LF, Muñoz-Jiménez L, Ramírez-Vargas E, Ibarra-Alonso MC, et al. Simultaneous polypropylene functionalization and nanoclay dispersion in PP/Clay nanocomposites using ultrasound. J Appl Polym Sci 2014;131:1–8.[4] Barkoula NM, Alcock B, Cabrera NO, Peijs T. Flame-Retardancy Properties of Intumescent Ammonium Poly(Phosphate) and Mineral Filler Magnesium Hydroxide in Combination with Graphene. Polym Polym Compos 2008;16:101–13. [5] Papageorgiou DG, Li Z, Liu M, Kinloch IA, Young RJ. Mechanisms of mechanical reinforcement by graphene and carbon nanotubes in polymer nanocomposites. Nanoscale 2020;12:2228–67.[6] Rao CNR, Sood AK, Subrahmanyam KS, Govindaraj A. Graphene: The New Two-Dimensional Nanomaterial n.d.[7] Galpaya D, Wang M, Liu M, Motta N, Waclawik E, Yan C. Recent Advances in Fabrication and Characterization of Graphene-Polymer Nanocomposites. Graphene 2012;01:30–49. |

**Keywords:** Hydrothermal carbon, polypropyle, melt-mixing, composite, mechanical properties.