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## GREEN SYNTHESIS OF SI-NPS FROM RICE AND WHEAT HUSK AND THEIR APPLICATIONS IN NANOCOMPOSITE SHEETS

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### Abstract

In this study, silica nanoparticles (SiNPs) have been synthesized from waste source such as rice husk (RHs) and wheat husk (WHs) by using method such as acidic hydrolysis, oxidation with  $\text{KNO}_3$  and  $\text{KMnO}_4$ , and pyrolysis. The purpose of this research was to reduce agriculture waste and reduce humans' ecological footprint. The synthesized SiNPs were used to create bio-nanocomposite sheets with various concentration of silica using a casting method, which could be used in food packaging instead of plastic, which is harmful to the environment and humans. The effect of nano-silica from RHs and WHs on the physical properties of nanocomposite sheets was investigated. Results showed that the nanocomposite sheet with 0.2 g WHs has the highest tensile strength, and the strength increased with increasing concentration, which is due to the presence of intermolecular interactions between silica and starch in the blend films. Water absorptivity of 0.2 g WHs with highest tensile strength decreased due to the addition of silica content. The results indicated that 0.2 RHs films had the highest water absorption at 49.4% after one hour of immersion, while 0.2 WHs films had the lowest absorption at 39.8% which is due to the network structure created by combining silica and starch plastic films. The synthesized SiNPs and bio-nanocomposites were characterized by using FTIR, SEM, XRD, UTM and particle size analyzer. By considering the results of the bio nanocomposites, they can be recommended for food packaging applications.

**Key words:** agricultural waste, bio-nanocomposite sheets, casting, mechanical properties, water absorption capacity

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