

## PHYSICAL PROPERTIES OF SEMICONDUCTOR BASED REGENERATED CELLULOSE NANOCOMPOSITES

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As a photocatalyst, bismuth ferrite (BiFeO<sub>3</sub>) was selected due to its less band gap energy (2.2 – 2.7 eV) to evaluate the degradation of methyl orange (MO) as an anionic dye. The regenerated cellulose films were derived from microcrystalline cellulose (MCC) sourced from empty fruit bunches of oil palm and prepared through a solution casting technique. During this process, varying amounts of BiFeO<sub>3</sub> (0 – 5 wt%) were incorporated into the MCC solution using the ionic liquid 1-butyl-3-methylimidazolium chloride. The photocatalytic activity of the resulting films was assessed by exposing the dye-catalyst mixture to direct sunlight until attaining a notable decolorisation of the dye. Specifically in this study, mechanical properties, thermal stability and water absorption were considered as the important application related physical properties. Tensile strength of the photocatalytic films lies around 10 MPa and the identified optimum film sample has a strain energy density of 2.8 MJ m<sup>-3</sup> which indicates a capability to withstand mechanical forces. According to thermogravimetry analysis results, the weight loss of photocatalytic films is less than 5 wt% at possible extreme temperature environments. As a favorable phenomenon for photocatalytic degradation, water absorption was evaluated for the synthesised films. The photocatalyst shows 60% of water absorption after 2 h of immersion in water and it was identified as a favorable practical condition to facilitate photocatalytic degradation of MO.

*Financial assistance from Ministry of Education, Malaysia (Grant No. FRGS/I/2019/STG07/USM/02/15) is acknowledged.*

**Keywords:** Methyl orange, Photocatalyst, Physical properties, Tensile strength