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Biocomposite Materials of *Eleocharis dulcis* Fibers with Iron (III) Nanoparticles and Its Potential for Sasirangan Textile Wastewater Treatment

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Abstract

Eleocharis dulcis (Chinese water chesnut), locally Kalimantan named Purun Tikus, is a plant that grown in highly acidic swamps areas in South Kalimantan. *Eleocharis dulcis*(ED), was usually used as material for traditional handicrafts. Therefore it is necessary for develop and innovate to convert the material becomes valuables. This research focus on the study of biocomposite nanoparticles of ED and its potentials as an adsorbent to reduce concentration of Pb^{2+} ion, Total Suspended Solid (TSS) and color from Sasirangan textile industry wastewater. The synthesis of the biocomposite nanocomposite was made by solvothermal synthesis. Firstly, ED stemsdried was cutted to small size (250 micron), then through delignification process to eliminate lignin by 1% w/v NaOH solution. ED delignification put into hydrothermal reactor, right afterward was carried out by one-pot solvothermal reaction of 1,6-diaminohexane, iron (III) chloride hexahydrate, and ethylene glycol at 200 °C for 6 h. The process was produced two types of biocomposites, without the amino group (EDB-M) and the amino group (EDB-MH). The characterization results shown by SEM, magnetic nanoparticles have been formed on the surface of ED fiber. The ED biocomposite nanoparticles (EDB) with diameter size around 30–50 nm could be obtained. X-Ray Diffraction (XRD) analysis showed treatment of ED delignification was increased the porosity of the fiber, shown by increased Crystallinity Index (CrI) about 72.75%. The biocomposites adsorbent, EDB-M and EDB-MH had adsorption capacity for Pb^{2+} ions about 44.21 mg/g and 55.62 mg/g at equilibrium pH (pH_e) of 6 and equilibrium time of 2 hour. The effectiveness of reduced TSS was about of 91.9% and 98.1%. Beside that, the colour intensity of color was decreased about 96.7% and 97.8% for the EDB-M and EDB-MH, respectively.

Keywords:

adsorption; biocomposite; *Eleocharis dulcis*; iron (III) nanoparticle; Pb^{2+} ion; TSS; color

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