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| **Published Researches****الأبحاث المنشورة** |
| Title**عنوان البحث** | [Facile fabrication of polystyrene/lignin/OV-POSS nanocomposite monolith by thermally induced phase separation method for wastewater cleanup](https://link.springer.com/article/10.1007/s00289-024-05193-1) |
| Author**الناشر** | Abeer Alassod, Weaam Alkhateeb, Ibrahim Alghoraibi, Ghrood Alassod, Rasha Alassod |
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| Abstract**خلاصة** | In this study, we successfully fabricated biocomposite monoliths using a facile, cost-effective, and friendly method via the thermally induced phase separation method using Polystyrene, Lignin, and OV-POSS. The properties of the prepared composites were estimated using Fourier transform infrared measurement (FTIR), scanning electron microscopy (SEM), and thermogravimetric analyzer (TGA). Furthermore, wettability properties were studied using water and oil. FTIR analysis indicates Polyester, Lignin, and OV-POSS were physically blended. The investigation by SEM showed the successful merging of components. Moreover, it revealed that OV-POSS nanoparticles acted as a support for reduced surface roughness. TGA measurements revealed that thermal stability was much better with increased OV-POSS loading. OV-POSS modified monolith exhibited hydrophobic with water contact angles of more than 130°. Results indicate that the produced monolith has a good sorption behavior to oils and organic liquids, whereas PL10L-0.3P showed higher sorption capacities followed by PL10L-0.1P, PL10L, and PL, respectively. The performance of the monoliths on oil/water separation was investigated through the selective removal of oil or organic solvent from water. Hence, the monoliths showed high separation efficiency above 90% and good reusability. The analysis showed that the adsorption for the oil and solvent process followed the pseudo-second-order model with a linear regression coefficient (*R*2) of > 0.999. The equilibrium data fit well with the Langmuir model. Besides, thermodynamic parameter analysis results showed that the adsorption was spontaneous and endothermic. An economic study examining the obtained resulted in a rate of investment (ROI) of 38.12%, a breakeven point (BEP) of 44.70%; this research is expected to be useful for the monolith industry that has attractive potential in practical industrial water treatment. |