## Facile mild hydrothermal treatment for surface functionalization of carbonized sawdust

## ABSTRACT

This work illustrated the preparation of highly dispersive carbonized sawdust by surface functionalization through a facile mild hydrothermal treatment with an aqueous mixture of reactants, potassium persulfate and potassium hydroxide (KPS:KOH), at 160 °C. The dispersion, morphological and purity analyses play an important role in the determination of the optimal hydrothermal process parameters. Dispersion test unveiled well dispersed modified carbonized sawdust's in polar solvent (ethanol) and no significant morphological changes according to the field emission scanning electron microscopy (FESEM) images. The intensity ratio (I<sub>D</sub>/I<sub>G</sub>) from the Raman measurement displayed an increased in the modified carbonized sawdust's I<sub>D</sub>/I<sub>G</sub> which indicated successful surface functionalization. Fouriertransform infrared spectroscopy (FTIR) and X-ray photoelectron spectroscopy (XPS) spectra revealed the introduction of various functional groups onto the carbonized sawdust surface, while the increment in the oxygen and potassium elements percentage (at. %) based on the energy dispersive X-ray system (EDX) supported both FTIR and XPS findings. Carbonized sawdust treated in 1:3 M ratio of KPS:KOH mixture (0.07 M:0.21 M) for 60 min showed the best dispersion in ethanol for at least a month with high degree of functionalization and various oxygen based functional groups were attached on its surface.