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Microscale Oil Adsorption Characterization of Single Fibre Filaments

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Electrospun polystyrene (PS) fibres has been shown to possess better sorption performance than the commercial melt blown polypropylene (PP) sorbent. On a microscale level, the oil - sorbent interaction and its effect on the sorption behaviour is yet to be fully understood; as different parameters has been attributed to the sorption behaviour of fibrousmat. In this study we used the drop-on-fibre theory to quantitatively evaluate the oil adherence potential of single filament of electrospun PS and melt-blown PP fibre to different oils.

Sunflower and motor oils, with completely different viscosity values were used to evaluate the drop volume and adhesive energy distribution on the fibres. Sunflower oil was observed to break up into more barrel shaped droplets on both fibres and exhibits a higher contact angle (CA), with an average CA of 37.82° and 37.38° on the PS and PP fibreS respectively. Motor oil on the other hand, showed an average contact angle of 35.04° and 29.82° on the fibres respectively. Strong link between the chemical structure and the oil affinity of single filament was observed as PS fibre was seen to exhibit sorption performance of between 3 – 6 times those of Meltblown PP.

This study further elucidate the oil adsorption affinity of electrospun polystyrene fibre down to a microscale level of a single filament in comparison to Meltblown PP fibre. It also characterizes the two sorbent fibres and gives an in-depth knowledge about the importance of material choice for sorbents used for oil spills clean up.

Biography:

Muftau Jide Akanbi, holds a first and second degree in Mechanical Engineering from the University of Ilorin, Nigeria and University College London (UCL) respectively. He is currently pursuing his PhD degree under the supervision of Suwan Jayasinghe. His research interest include engineering and characterization of novel fibrous material for oil spill remediation. He also has a strong interest in electrospinning and functionalization of scaffolds for tissue engineering, biological and environmental application.