

Magnetic PVF/Fe₃O₄@PS Mat via Electrospinning for Oil Clean-up

Zhe Jiang¹, Nina Liao¹, Mark Kenneth Reyes¹, and Cheol Sang Kim^{1, 2*}

¹ *Department of Bionanosystem Engineering, Graduate School, Chonbuk National University, Jeonju, Jeonbuk 561-756, Republic of Korea*

² *Division of Mechanical Design Engineering, Chonbuk National University, Jeonju, Jeonbuk 561-756, Republic of Korea*

* Fax: +82 63 270 2460; E-mail address: *chskim@jbnu.ac.kr

Oil spillage in seas and oceans is a major contributor to pollution thus there is a need to remove and clean the oil immediately. Recently, several groups have used different techniques to effectively remove oil by fabricating novel materials including the use of electrospinning [1-3]. In the present study, a novel composite mat composed of polystyrene (PS)/polyvinylidene fluoride (PVdF) with selective incorporation of magnetite iron oxide (Fe₃O₄) nanoparticles (NPs) on/in PS was successfully prepared via a one-step two-nozzle electrospinning process. FE-SEM and EDS characterization showed the highly-porous structure of the composite mats and confirmed the presence of the Fe₃O₄ nanoparticles on/in the nanofibers. Both PS and PVdF nanofibers showed oleophilic and hydrophobic properties. The oil sorption capacity was tested. The results showed improved mechanical properties when PVdF was added to the composite mat compared to pristine PS mat. In addition, the incorporation of magnetic Fe₃O₄ nanoparticles in the composite mat helps for easy gathering and removal the composite mat after the oil clean-up process. Oil absorption capacity and water-oil separation and filtration test were conducted and analyzed and showed better results for the composite mats compared to pristine PS mats. The present electrospun (Fe₃O₄/PS)/PVdF fiber shows high potential as oil sorbent and may be applied for removal of oil spillage in seawater and waste water treatment effectively.

References

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