

## Synthesis of Iron-Modified Montmorillonite as Filler for Electrospun Nanocomposite Fibers

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**Abstract :** Montmorillonite (MMT) is a very abundant clay mineral and is versatile such that it can be chemically or physically altered by changing the ions between the sheets of its layered structure. This clay mineral can be prepared into functional nanoparticles that can be used as fillers in other nanomaterials such as nanofibers to achieve special properties. In this study, two types of iron-modified MMT, Iron-MMT (FeMMT) and Zero Valent Iron-MMT (ZVIMMT) were synthesized via ion exchange technique. The modified clay was incorporated in polymer nanofibers which were produced using a process called electrospinning. ICP analysis confirmed that clay modification was successful where there is an observed decrease in the concentration of Na and an increase in the concentration of Fe after ion exchange. XRD analysis also confirmed that modification took place because of the changes in the d-spacing of Na-MMT from 11.5 Å to 13.6 Å and 12.6 Å after synthesis of FeMMT and ZVIMMT, respectively. SEM images of the electrospun nanofibers revealed that the ZVIMMT-filled fibers have a smaller average diameter than the FeMMT-filled fibers because of the lower resistance of the suspensions of the former to the elongation force from the applied electric field. The resistance to the electric field was measured by getting the bulk voltage of the suspensions.

**Keywords :** electrospinning, nanofibers, montmorillonite, materials science

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