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FABRICATION OF WATER-REPELLENT TEXTILE THROUGH STEARIC ACID-MODIFIED MAGNESIUM HYDROXIDE DERIVED FROM NATURAL DOLOMITE

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The addition of hydrophobic and superhydrophobic characteristics to textile surfaces has attracted significant attention of researchers and industry due to its excellent potential in outdoor apparel and protective fabrics. In this study, we have developed a novel, simple, and an efficient technique to convert hydrophilic polyester fabric into hydrophobic fabric using natural dolomite as the magnesium hydroxide precursor. Using a dip-coating procedure, a thin layer of stearic acid-modified, precipitated magnesium hydroxide was applied to the fabrics, transforming the wetting fabric into a hydrophobic one. Stearic acid serves both as a surface modifier to render $Mg(OH)_2$ hydrophobic and as a binder to adhere the surface-modified nanoparticles to the textile. The wetting property and surface morphology of the treated fabrics were characterized using contact angle/sliding angle measurements, field emission scanning electron microscopy, Fourier transform infrared, and thermogravimetric analysis. The findings reveal that the wettability of the fabric was greatly reduced depending on the experimental parameters, such as the concentration of stearic acid and the amount of stearic acid-modified precipitated $Mg(OH)_2$ nanoparticles. The technique successfully achieved a maximum contact angle of 150˚ and a sliding-off angle of 8.5˚ with 5% of nanoparticles. Further, the modified fabric exhibits potential flame retardancy since $Mg(OH)_2$ is an environmentally friendly inorganic flame retardant. Moreover, this can be considered as a method of value addition to a natural mineral resource.

Keywords: Dolomite, Magnesium hydroxide, Self-cleaning property, Water repellency