

Development of Thermo-Regulating Fabric Using Microcapsules of Phase Change Material

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Abstract : In textiles, the major interest in microencapsulation is currently in the application of durable fragrances, skin softeners, phase-change materials, antimicrobial agents and drug delivery systems onto textile materials. In our research "Polyethylene Glycol" was applied as phase change material and it was encapsulated in polymethacrylic acid (PMA) by radical polymerization in suspension of methacrylic acid in presence of N,N'-methylenebisacrylamide (MBAM) as crosslinking agent. Thereafter the obtained microcapsule was modified by amidation with ethylenediamine as a spacer molecule. At the end of this spacer trichlorotriazine reactive group was fixed. Microcapsules were grafted onto cotton textile substrate. The surface morphologies of the microencapsulated phase change materials (micro PCMs) were studied by scanning electron microscopy (SEM). Thermal properties, thermal reliabilities and thermal stabilities of the as-prepared micro PCMs were investigated by differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA). The results obtained show the obtaining microcapsules with a mean diameter of 10 μm and the resistance of the microcapsules is demonstrated by thermal analysis.

Keywords : energy storage, microencapsulation, phase-change materials, thermogravimetric analysis (TGA)

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