

A Review on Application of Phase Change Materials in Textiles Finishing

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Abstract : Fabric as the first and most common layer that is in permanent contact with human skin is a very good interface to provide coverage, as well as heat and cold insulation. Phase change materials (PCMs) are organic and inorganic compounds which have the capability of absorbing and releasing noticeable amounts of latent heat during phase transitions between solid and liquid phases at a low temperature range. PCMs come across phase changes (liquid-solid and solid-liquid transitions) during absorbing and releasing thermal heat; so, in order to use them for a long time, they should have been encapsulated in polymeric shells, so-called microcapsules. Microencapsulation and nanoencapsulation methods have been developed in order to reduce the reactivity of a PCM with outside environment, promoting the ease of handling, decreasing the diffusion and evaporation rates. Methods of incorporation of PCMs in textiles such as electrospinning and determining thermal properties had been summarized. Paraffin waxes catch a lot of attention due to their high thermal storage density, repeatability of phase change, thermal stability, small volume change during phase transition, chemical stability, non-toxicity, non-flammability, non-corrosive and low cost and they seem to play a key role in confronting with climate change and global warming. In this article, we aimed to review the researches concentrating on the characteristics of PCMs and new materials and methods of microencapsulation.

Keywords : thermoregulation, microencapsulation, phase change materials, thermal energy storage, nanoencapsulation

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