Laptop Working Temperature Decreasing Aided by Nano-insulators

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Researchers have recently developed straightforward and low-cost methods for the production of fibrous composites containing iron oxide nanoparticles, leading to new thermal energy management approaches using dynamic insulators. The prepared products can be utilized in construction, textiles, polymers, food packaging, solar cells, and laptop batteries.

Nowadays, fossil fuels independence and the possibility of replacing them with renewable energies such as thermal energy, is one of the most notable issues in all over the world. Thermal energy storage can be possible by phase changing material usage, which can store or release energy while phase change process. Above-mentioned material is based on organic compounds and additionally have a liquid-solid phase change ability. There are two main problems about these compounds that are counted to be low thermal conductivity and unwanted energy release during heating/cooling procedures which may limit their functionalization.

Textile engineering researchers in Amirkabir University have synthesized a kind of phase changing material containing stabilized iron oxide nanoparticles used in polyester yarn to manage and store thermal energy based on an affordable and one-step method. This approach leads to the elimination of phase changing organic compounds drawbacks (or the phase changing materials used for thermal energy storage). In this study, phase changing composite containing stabilized iron oxide nanoparticles on the polyester yarn have been designed to manage and store thermal energy, and also to eliminate mentioned problems. Moreover, fatty acids, polyester, and iron oxide nanoparticles have been employed as the phase changing material, background material, and nano filler, respectively.

In the past researches, electrospinning process, micro/nano encapsulation, and polymerization process have been reported for developing these phase changing materials which are required of advanced and expensive equipment. However, in this investigation, phase changing materials are loaded on polyester yarn by a simple process of adsorption

based on hydrophobic-hydrophobic attraction.

The synthesized fibrous composites can be used in various applications related to the management and storage of thermal energy in their functional temperature range (26.9 to 54 .1°C). As an example, these composites are functional in construction industry to be placed in building walls for thermal energy management. These material can store heat during day time (the time of energy abundance) and release it during night (the time of energy shortage).

As a result, they can act as a dynamic insulator and keep the room temperature on a favorable stage. To count the other functionalities of named composites, we can focus on textiles, polymer, food packaging, and solar cells or even laptop batteries applications. Therefore, thermal energy management and the case of "a specific temperature for a particular application" would be available utilizing these composites, for instance they can be used as a laptop battery covering to absorb heat produced while working by temperature raise to cool the battery and keep its temperature fixed.

Results of these study have been published in journal of Applied Energy in 2020.