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PCM examine of Silica/Decane nanostructure in the presence of copper oxide nanoparticles to improve the solar energy capacity of glass in the solar collectors via MD approach

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Abstract
Energy storage is of particular importance for the use of alternative energy sources. One of the new and efficient procedures in thermal energy storage (TES) in the appropriate form is using phase change materials (PCM). PCMs store energy in the latent heat (LH) of melting without mechanical tools, entirely intelligently, or anything other than their intrinsic propensity to spontaneously change phases, adapt to environmental changes, and actively seek for ways to use less energy. Because of the role of melting and freezing processes in TES systems, it is significant to study and identify the behavior of PCMs during the melting and freezing process. In this investigation, molecular dynamics simulation (MDS) has investigated the thermal behavior (TB) of glass in the presence of paraffin (Decane) and CuO nanoparticles (NPs). The effect of the number of NPs with values of 1, 2, and 3 on TB has been investigated. The results showes that in the absence of CuO NPs, the heat flux (HF) of the structure converges to 678.168 W/m2. Then with the addition of 3 CuO NPs, the HF increased from 678.168 to 1506.23 W/m2. Also, the thermal conductivity (TC) of the structure in the final step is equal to 0.741 W/m.K, which indicates the optimal behavior of the designed atomic structure. And by increasing the number of NPs to 3 NPs, the TC increases to 1.48 W/m.K. © 2022

Author Keywords
Molecular dynamics simulation; Phase change material; Solar; Thermal behavior

Index Keywords
Copper oxides, Freezing, Glass, Heat flux, Heat storage, Melting, Nanoparticles, Paraffins, Phase change materials, Silica, Solar energy, Thermal conductivity; Copper oxide nanoparticles, CuO nanoparticles, Dynamics simulation, Energy, Freezing process, Glasses In, Melting process, Molecular dynamic simulation, Solar, Thermal behaviours; Molecular dynamics

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