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Decoration of Carbon Nanocomposites on Textile for High Photothermal Conversion

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ABSTRACT (NO MORE THAN 500 WORDS:)

Owing to its environmentally friendly and low-cost process, solar-driven evaporation attracted tremendous research attention, and has been applied in sterilization, desalination, and power generation et al. to date, Compared to conventional bulk heating-based evaporation, solar-driven interfacial evaporation has been determined as a promising technology, which can potentially reduce thermal losses and improve energy conversion efficiency. Despite tremendous efforts to improve solar-driven steam generation, the development of solar steam generators with durability, portability, and high photothermal performance remains a significant challenge. Here, solar absorbers based textile are produced by uniformly decorating carbon nanocomposites on the fibril skeletons of pristine textile. The unique fabric structure and the broadband absorption by carbon nanocomposites allowed the absorbers based textile to exhibit high light absorption in the wavelength range of 300 to 2500 nm. The special structural feature of textile, which multiplies available evaporation area and possesses superior air permeability, promote solar evaporation. Moreover, the solar steam evaporator based textile existed great washability, flexibility, and excellent mechanical strength for low-cost, durable, and portable solar-steam applications. This unexpected finding reveals the hidden potential of textile as a low-cost material and provides inspiration for the future design and development of high-performance solar-driven steam generators.