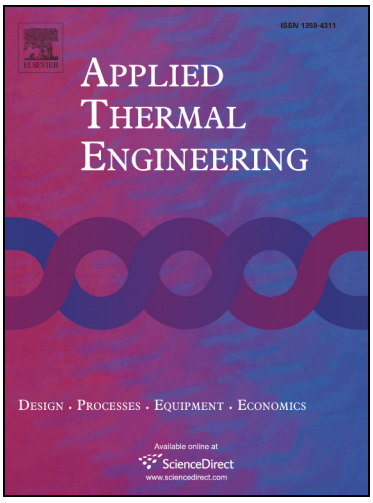

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Efficient Solar Water Vapor Generation Enabled by Water-Absorbing Polypyrrole Coated Cotton Fabric with Enhanced Heat Localization

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Abstract

Solar-driven water evaporation is a simple and feasible technique in addressing the global challenge of freshwater scarcity. The conventional water vapor generation is a bulk heating process, resulting in a relatively low efficiency due to unnecessary thermal energy loss. In this work, we propose an efficient water evaporation system with enhanced localized heating which was designed by using the polypyrrole (PPy) coated cotton fabric in conjunction with a floating pore-closed polystyrene (PS) foam. The hydrophilic PPy/cotton with a broadband light absorption was obtained via a facile in-situ polymerization, and it could absorb and convert most of the incident light to heat for effective interfacial water evaporation. Meanwhile, the PS foam served as not only a supporting material but also an excellent heat barrier to restrain heat transmission from the photothermal material surface to the bulk water. The PPy/cotton-foam