Laser-Drawn Groove Structures on Wood for Continuous Solar Steam Generation in Saline Water

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Solar steam generation is a promising desalination technology to solve global water shortage. Here, a natural wood-based solar steam generator (SSG) with high energy conversion efficiency and salt resistance was developed. Various grid patterns with different groove depths and grid intervals on different thicknesses of natural wood were directly fabricated by CO_2 laser. Graphitic carbon layer (GCL) obtained by laser-induced graphitization performed high solar absorption and hydrophilicity, which facilitated the transport of water. The low thermal conductivity of natural wood reduced the heat loss to bulk water. The groove structures in the grid increased the evaporation rate owing to retrieved radiant heat from the GCL surface to the filled water layer in groove. The facile supply of water through the grooves endowed the SSG with salt resistance and self-regenerating abilities. The salt resistance and solar evaporation rate were maintained over 2 weeks in highly saline water, which indicates that the SSG can be used in desalination for long-term.