Plasmonic nanoparticles-decorated glass-fibers: new absorber for solar steam generation and organic solvents recovery

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Interfacial solar to steam generation is one of the solutions for sustainable development due to its ability to produce freshwater using renewable energy source-solar light. In this work, we develop a SiO2 coated glass-fiber absorber decorated with gold nanoparticles (MSGF-Au NPs) by using dry plasma reduction (DPR) method. This MSGF-Au NPs absorber has high light absorption property to obtain efficient steam generation performance. Specifically, MSGF-Au NPs sample shows higher light absorption value (over 90%) than that of sample without mesoporous coating (50%). The final sample effectively generates steam with an evaporation rate of 1.2 kg/m2h under 1-sun illumination. Moreover, MSGF-Au NPs sample is also applied to organic solvent vaporization. As a result, under 1-sun condition the evaporation rates of hexane, octane, decane, and dodecane are 36.29, 3.59, 1.40, and 0.16 kg/m2h respectively.