

Au, Ag Nanoparticles and Cellulose Micro-nanofiber Composites toward Solar-driven Steam Generation

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The recent advances in the development of solar-driven steam generator is mainly focused on the photothermal converting materials and hydrophilic supports. The gold (Au) and silver (Ag) nanoparticles (NPs) are well known as highly efficient photothermal converting materials due to the phenomenon of the localized surface plasmon resonance. The fabrication of the porous and hydrophilic support which supplies enough water by capillary force to the surface of NP is another key factor.

In this study, we developed highly efficient solar-driven steam generator based on Au, Ag NPs and cellulose micro-nanofiber (CMNF) composites. Polyethyleneimine (PEI) which was used as reducing agent for Au, Ag NPs synthesis was found to increase binding property of NPs-CMNF. The size of NPs and the light absorption property were effected by the concentration of PEI, which is a crucial factor for photothermal conversion efficiency. The steam generation efficiency of 81% was achieved under 1sun with the developed solar-driven steam generator, which was stable for 10 times of recycled test.