

Gold nanoparticles immobilized onto glass fiber coating SiO<sub>2</sub> as an efficient photo-thermal layer for water evaporation

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Clean water scarcity become an urgent global issue restricting sustainable development. One of the solution recently to obtain fresh water with minimum greenhouse gas emissions is solar to steam generation. Herein, we present the immobilization of the gold nanoparticles (Au-NPs) onto glass fiber that can be employed as an efficient photo-thermal layer in solar to steam device under high optical concentration and stability uses. The substrate with Silicon dioxide (SiO<sub>2</sub>) coating allows tuning of the porosity and the pore volume of the sample. Therefore, the chloroauric acid (HAuCl<sub>4</sub>) precursor was easily attached onto the pore sites on the surface of SiO<sub>2</sub>. The gold ions are then reduced to AuNPs by using dry plasma reduction under near room temperature, atmospheric pressure and without using any chemical reagents. As the results, AuNPs is successfully immobilized on the surface of SiO<sub>2</sub> glass fiber. Finally, the synthesized AuNPs/SiO<sub>2</sub> glass fiber samples were applied as a photo-thermal layer in solar to steam generation devices. As the result, the water evaporation rate is higher than that of the device without using AuNPs.