Fabrication of Plasmonic Photothermal Film Using Metal Nanoparticles

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The solar photothermal materials have been interested for additional/improved power energy conversion in solar devices. The solar photothermal films have been revealed a benefit in terms of absorption wasted sunlight, which can produce the electricity when the photothermal film is contacted with thermoelectric module device. In this work, we will optimize and fabrication of plasmonic photothermal film via metal nanoparticles film. The enhancement was attributed from LSPR phenomena (the plasmonic heating effect), which was a result from the interaction between the incident light and free electrons in a metal nanoparticle, thus resulting in the greater photo-thermal energy generation. To study the photothermal effect, the thermoelectric module was attached to the metal nanoparticle films. Photothermal gold nanoparticles (AuNPs) film, silver nanoparticles (AgNPs) film and metallic grating surface film enhanced the absorption of white light by the surface plasmon excitation on the metallic nanostructure and the light absorption from nanoparticles could be utilized as a heat source for thermoelectric devices. The ability to convert the electricity from photothermal effect in our system will be examined and optimized. In order to get the good light management in the developed photothermal film energy conversion devices, the developed plasmonic photothermal film will be investigated and used in the application of solar thermoelectric conversion systems.

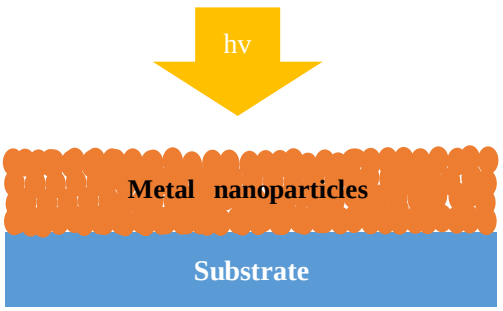

Fig. 1. Schematic of photothemal film device based on metal nanoparticle film under light irradiation.

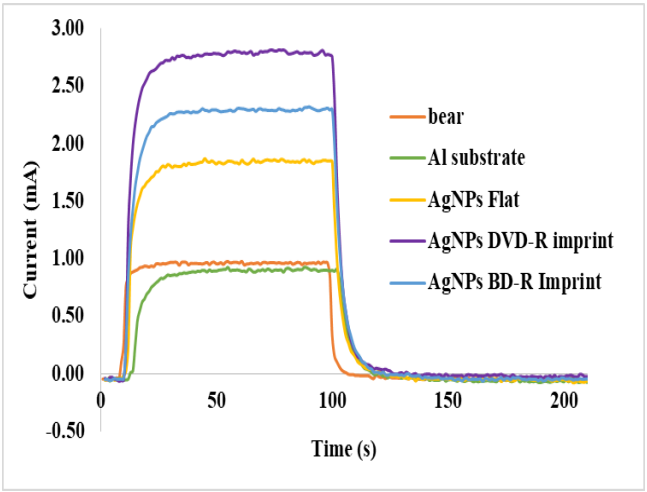

Fig. 2. I-T properties by the irradiation of white light on silver nanoparticle films.

References:

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