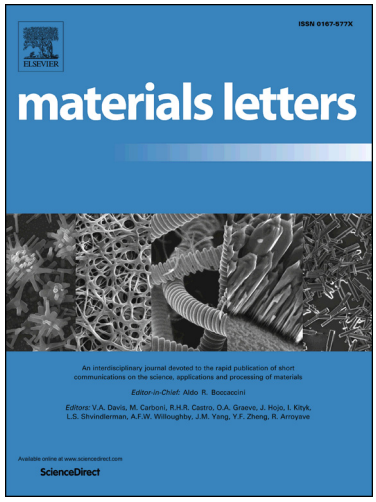

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Efficient light harvesting in dye sensitized solar cells using broadband surface plasmon resonance of silver nanoparticles with varied shapes and sizes

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Abstract

Plasmonic silver nanoparticles of varied shapes and sizes (v-AgNPs) were synthesized *via* facile one-pot chemical reduction method and investigated their applicability in dye sensitized solar cells (DSSCs). The synthesized v-AgNPs exhibit broadband absorption over entire visible region owing to their unique localized surface plasmon resonance (LSPR). The photon conversion efficiency (PCE) of DSSCs increased ~50% by incorporating ~ 1wt% of v-AgNPs in ~ 4μm thin reference photoanode. The enhancement is mainly due to increase in light harvesting ability of plasmonic photoanode as a result of local electromagnetic field enhancement and strong near field scattering effect of v-AgNPs. In addition, the reduction in charge transfer resistance value (R_2) further confirms the high charge carrier generation in plasmonic DSSCs.

Keywords: Nanoparticles, Solar Energy Materials, Plasmonic, LSPR, Broadband Absorption, DSSCs.