Optimizing the Position of Silver Nanoparticles in Plasmonic Solar Cells (PV-2)

**Scientific Achievement:**
Study of plasmonic effect of silver nanoparticles in $pn$-heterojunction solar cells comprising Earth-abundant, non-toxic nanocrystals (CZTS and Cu@AgInS$_2$). Optimization of the position of the plasmonic nanoparticles for both direct and inverted structures.

**Significance and Impact:**
The appropriate location of silver nanoparticles in $pn$-heterojunction solar cells was optimized by introducing them (1) in the $p$-layer, (2) in the $n$-layer, (3) in both the layers, and (4) at the interface between the layers of $p$- and $n$-type nanocrystals. Presence of the nanoparticles in the $p$-layer is superior compared to nanoparticles in the $n$-layer, with 1.48% (direct) and 0.80% (inverted) conversion efficiencies.

**Research Details:**
- Synthesis of CZTS and Cu@AgInS$_2$ nanoparticles by colloidal synthesis approach and their characterization.
- Fabrication of heterojunction solar cells with plasmonic nanoparticles with both direct ($pn$) and inverted ($np$) structures.
- Characterization of the photovoltaic devices.


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