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Abstract

In this paper, we experimentally demonstrate the performance of plasmonic silicon (Si) solar cells fabricated using silver (Ag), indium (In), and aluminum (Al) nanoparticles (NPs) of specific dimensions. The nanoparticles were produced using an anodic aluminum oxide (AAO) template as a deposition mask. AAO masks with a thickness of 700 nm and pore diameter of 100-110 nm were fabricated using a single-step anodization and pore widening process aimed at controlling the dimensions and coverage of the metallic NPs with a high degree of precision. Our ultimate objective was to facilitate a comparison of plasmonic effects induced by the various metallic NPs in Si solar cells. Scanning electron microscopy was used to examine the thickness, pore dimensions, and pore size distribution of the AAO template as well as the dimensions and coverage of the deposited metallic NPs. Measurements of optical reflectance and external quantum efficiency were used to