

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
New Materials and Structural Concepts (4)

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ENHANCEMENT OF OPTICAL ABSORPTION BY NANO PARTICLES

Abstract

One major challenge for photovoltaic solar cell is to improve its light-to-electrical efficiency while reducing its cost and weight. Scientists are investigating many methods to improve the solar cells light-to-electrical efficiency. Thin film solar cells satisfy the demand of the high efficiency, low cost, and low weight. Since most of the solar cells are based on the crystalline silicon wafer with the thickness between 200 and 300 μ m, and around 40% To overcome these light-trapping problems and to increase light absorption, new method based on excitation of surface plasmons via scattering from noble metal nanostructures was proposed. We study the optical absorption efficiency of the a-Si:H thin film with nano-metallic particles, and investigate the size and shape of these nano-particles. Our research shows that for a 100nm thick a-Si:H thin film, deposit an array of nano-metallic cubes or cylinders will increase the optical absorption in the red light (e.g. 650nm) dramatically. These nano-particle thin film solar cells can also be used for spacecraft.