NI-008 << 분과초청 >>

Plasma Synthesis of Silicon Nanoparticles for Next Generation Photovoltaics

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Silicon nanoparticles can be synthesized in a standard radio-frequency glow discharge system at low temperature (～200°C). Plasma synthesis of silicon nanoparticles, initially a side effect of powder formation, has become over the years an exciting field of research which has opened the way to new opportunities in the field of materials deposition and their application to optoelectronic devices. Hydrogenated polymorphous silicon (pm-Si:H) has a peculiar microstructure, namely a small volume fraction of plasma synthesized silicon nanoparticles embedded in an amorphous matrix, which originates from the unique deposition mechanism. Detailed discussion on plasma synthesis of silicon nanoparticles, growth mechanism and photovoltaic application of pm-Si:H will be presented.

Keywords: Silicon nanoparticle, PECVD, solar cell

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실리콘 박막 태양전지를 위한 CdSe계 양자점 광변환구조체

신명훈

한국항공대학교

Photon conversion technology for thin film solar cells is reviewed. The high-energy photons which are hardly absorbed in solar cells can be transformed the low energy photon by the photon conversion process such as down conversion or down shift, which can improve the solar cell efficiency over the material limit. CdSe-based quantum dot materials commonly used in LED can be used as the photon conversion layer for Si thin film solar cells. The photon conversion structure of CdSe-based quantum dot for Si thin film solar cells will be presented and the pros and cons for the Si thin film solar cells integrated with the photon conversion layers will be discussed.

Keywords: Si thin film, CdSe-based quantum dot, photon conversion, solar cell