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...ential. The dye synthesized layers containing C60 nanoclu... fabricate photosensitive rectifying heterojunction suitable for ... applications in photovoltaics. However the constructed devices give poor energy conversion efficiency. The possible way to increase this parameter may be seen in the modifications of fullerene layer structure in order to optimize the charge carrier transport mechanism and to reduce the recombination effects. The present paper aims at shining new light on the electrical and structural properties of fullerene films with different morphology by using a variety of analytical methods. Fullerene layers under examination were prepared by different techniques including vapor deposition, liquid sputtering and specially designed method of supercluster agglomerating for organizing fullerene layers with porous morphology. The electronic properties and charge transfer mechanisms in the layers prepared according to different techniques we applied were significantly different. The action spectra – of the photoresponse in the modified layer of fullerene superclusters demonstrate the best parameters for light collection efficiency and other photovoltaic properties. We also present here a theorethical model that describes the charge separation process at the interface region of constructed p/n junctions in the presence of surface recombination effects.

SVII-4: IL08 **Status and prospects of devices and systems for PV conversion**

M.A. GREEN, University of New South Wales, Sydney, Australia *(Invited)*

Over the last 25 years, the solar photovoltaic industry has grown from its infancy to a US1 billion/year industry. Over the next 25 years, even more explosive growth is anticipated. In the past, the workhorse for the industry has been the silicon solar cell fabricated on a self-supporting wafer of single crystalline or multicrystalline silicon, using technology largely borrowed from the microelectronics industry. Some time over the next 25 years, a dramatic change in technology is anticipated whereby cells will be made from thin layers deposited onto a supporting substrate or superstrate, such as glass. There are currently five different thin film solar cell technologies receiving commercial attention. In order of the level of commercial development, these are cells based on thin films of hydrogenated amorphous silicon, of the binary compound cadmium telluride, of the ternary compound copper indium diselenide and alloys with gallium and sulphur, and of thin film polycrystalline silicon, as well as thin film electrochemical cells using dye-sensitized titanium dioxide layers. In the past, the major commercial application for cells has been in supplying small amounts of power in remote areas. Over the last few years, a new, completely different, application has emerged to form the largest market sector. This new application is the generation of residential electricity in areas that are already connected to the electricity grid. This paper will discuss both the different cell technologies and the range of past and future applications with particular emphasis upon these residential applications.

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SVII-4: P01 **Low temperature amorphous and microcrystalline silicon films deposited by PECVD**

E.A.T. DIRANI, R.M. FARIA, F.J. FONSECA, A.M. DE ANDRADE, Escola Politecnica/USP, Sao Paulo, Brasil

Hydrogenated amorphous silicon films (a-Si:H) are indispensable for large area electronic devices like solar cells, image sensors and thin film transistors (TFTs). The limiting factors for the utilization of a-Si:H films are related to some of their characteristics like its low electronic mobility and the light induced conductivity degradation. While phosphorus doped (n+) a-Si:H are deposited yielding conductivity values no better than 10^{-2} S/cm, (n+) microcrystalline hydrogenated silicon (μc-Si:H) layers deposited at substrate temperature of 250°C show conductivity values of 10^{1} S/cm. In this paper the correlation among the surface morphology, substrate temperature and conductivity has been investigated in μc-Si:H and a-Si:H films deposited in the temperature range of 30° to 300°C on Mylar, Kapton, Aluminum, Poli-Si and Corning 7059 glass substrates using Raman and FTIR spectroscopy and atomic force microscope (ATM).

SVII-4: P02 **Thin silicon crystalline layer by liquid phase epitaxy**

N. RAUF, A. LAUGIER, INSA de Lyon, Villeurbanne, France

Liquid phase epitaxy (LPE) is used to growth a silicon layer for the photovoltaics application. The processing is carried out at the temperature below 900°C and the cooling rate of 0.5°C/min. We used substrate silicon orientation (111) to study the property of the layer. Tin is used as the solvent. We got a high crystallinity of silicon layer as verified by x-rays diffraction. SIMS measurement show that concentration of aluminum, gallium, and boron are linear and homogeneous in the layer. Hall measurement with Van der Pauw method on LPE-Si layer grown on a high resistivity (ρ> 1000 Ωcm) single-crystal substrate show a good agreement. The substrate ceramics is also used to growth a silicon layer because it is cheaper, thus it will be cut off the price of the product.

SVII-4: P03 **Low reflection coatings for high-efficiency silicon solar cells**

M.C. SANCHEZ, N. STEM, C. BRUNETTI, A.F. BELOTO, C.A.S. RAMOS, Escola Politécnica/USP, Sao Paulo, Brasil

This paper summarizes a theoretical-experimental optimization of several anti-reflection structures for crystalline silicon solar cells. This comparison was made using SiO_2, Ta_2O_5 single layer and MgF_2-ZnS double layer over polished surfaces. The optimization was made using reflection curves and short-circuit current densities (J_{sc}), which were obtained from each of the analyzed structures. A very low experimental reflection for double layer was observed. Experimental J_{sc} = 37.03 (mA/cm²) was obtained for MgF_2-ZnS double layer, while for Ta_2O_5 and SiO_2 single layer the results were 34.84 (mA/cm²) and 33.00 (mA/cm2), respectively. These results were compared with maximum J_{sc}=38.70 (mA/cm²) for a standard cell with no reflection. Reflection curves and short-circuit current densities of double layer are less sensitive to thickness variation, when compared with single layer ones.

SVII-4: P04 **The electron beam melting influence on the metallurgical-grade silicon purification for solar-grade silicon**

A.F. BUENO BRAGA, J. OTUBO, P.R. MEI, State University of Campinas, Campinas, S.P., Brasil

Silicon is still most widely used as solar cell material, both for high efficiency cells and also for low cost applications. The present work reports an alternative way for purifying metallurgical-grade silicon (MG-Si). Leached metallurgical-grade silicon (99,9% w) was processed by electron beam melting under 10^{-3} Pa. Variable beam power and beam incidence time were established. Elemental analytical results showed that the process removed C, O, Al, P, and Ca. There was segregation of Fe, Ca, and C at the grain boundaries. The samples were mapped from the edge to the center (radial direction) and from the bottom to the top (longitudinal direction) by atomic absorption spectrometry. It was found an impurity concentration gradient increasing from the edge to the center and from the bottom to the top of the sample. The best results were found in edge of the sample treated at 16 kW for 20 minutes that showed a 99,999%w silicon.

SVII-4: P05 **Photoelectric properties of Si heterojunctions with nanocrystalline wide band gap nitrides layers**

A. SOKOLOWSKA, A. OLSZYNA, **J. SZMIDT,** A. WERBOWY, Warsaw University of Technology, Warsaw, Poland

Nanocrystalline BN, AlN and C_3N_4 layers have been deposited on Si wafers by impulse plasma assisted CVD process. Relative quantumefficiency of photovoltaic effect in heterojunctions with nanocrystalline layers ahs been investigated. Properties of n-Si/p-nanoAlN, n-Si/p-nanoBN heterojunctions and nanoC_3N_4 MIS structures have been compared. The investigations proved that the nanocrystalline layers, well transmitting the light absorbed by Si, play important role in the creation of a high electric barrier in the junction. They could also act as antireflection coatings.

SVII-4: P06 **Antireflections layers by PECVD for multicrystalline silicon solar cells**

K.A. ABADE, **F.J. FONSECA,** EPUSP, Sao Paulo, Brasil

This work describes the study about double layer antireflection coating (DLAC) deposited by PECVD on mono and multicrystalline silicon solar cells. Among the various substrates used is a national production material and innovating technique. Hydrogenated amorphous silicon nitride (Si_xN_y:H) and silicon oxynitride (SiN_xO_y) were deposited by PECVD mono-chamber reactor. The films were characterizated by ellipsometry, optical gap, FTIR, absorbance and reflectivity, besides the electro-optical characterization of the solar cells. The dependence of the electrical characteristic of the solar cells with the thickness of the films is shown as well as the various