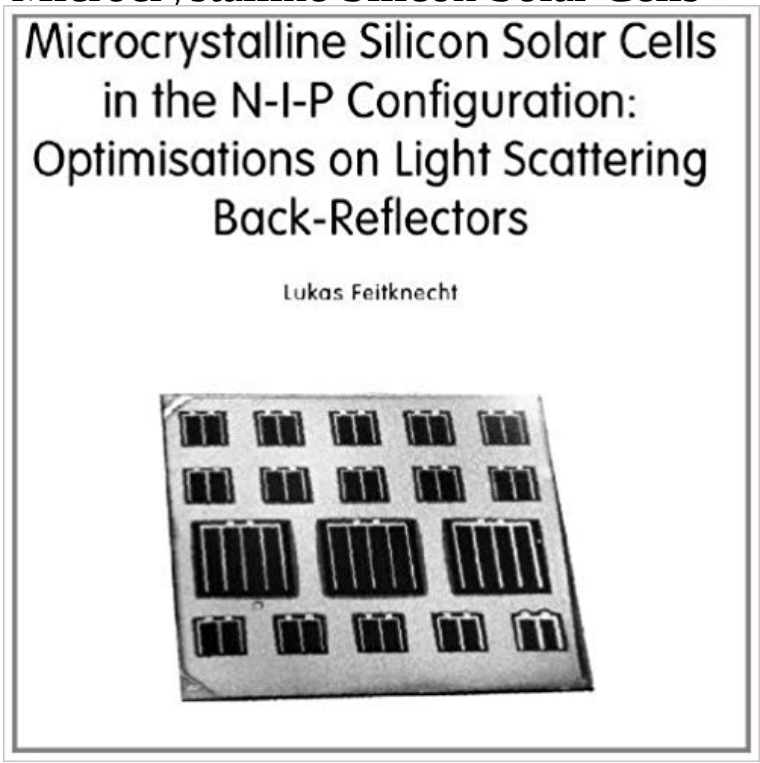
Microcrystalline Silicon Solar Cells



Thin films of hydrogenated microcrystalline silicon (c-Si:H) are deposited by the Plasma Enhanced Chemical Vapour Deposition method onto substrates with the aim to fabricate solar cell devices. In the time span from late 1997 to early 2002 the main challenge of this work is the optimisation of functional solar cells in the n-i-p configuration with respect to newly introduced substrates (e.g. glass, stainless steel, Kapton), better Transparent Conductive Oxide contact materials (sputtered ZnO (Zinc Oxide) at the back-contact and LP-CVD ZnO at the front contact, replacing ITO) while maintaining high film deposition rates around 8 A?/ sec and resulting in conversion efficiencies around # = 8%.The transition from microcrystalline to amorphous growth conditions is observed based on a so called dilution series which served for a variety of observations and which was used by many members of the research groups at IMT Neucha?tel and in Prag: Silicon films were deposited at various silane concentrations around the phase transition of microcrystalline to amorphous silicon, for both intrinsic films deposited onto glass and the intrinsic absorber layer within the n-i-p solar cells. Investigations on optical, electrical, and structural (crystallographic) aspects led to a better understanding of the c-Si:H material.This thesis is split into two parts:Part I presents three fabrication methods of microcrystalline silicon thin films. The first chapter on the PE-CVD method comments on how films and cells are fabricated and analysed.Part II comments on the optimisation of n-i-p solar cells fabricated by PE-CVD method: The excellent optical absorption properties of c- Si:H films are necessary but not sufficient for solar cell fabrication because the n-i-p device consists not simply of a succession of different films, but only a general view on the optimisation process of

films, interfaces, substrates and the two electrical contacts (at the back and the front) result in a reasonably working solar cell.

Highefficiency microcrystalline silicon singlejunction solar cells The authors present three-dimensional electromagnetic simulations of an n-i-p substrate-type microcrystalline silicon solar cell applying a **Amorphous and Microcrystalline Silicon Solar Cells - Solar Cell** Microcrystalline silicon layers for thin film solar cells prepared with Hot Wire Chemical. Vapour Deposition and Plasma Enhanced. Chemical Vapour Deposition. **Microcrystalline silicon solar cells deposited using a - Scitation** RESEARCH ARTICLE. Microcrystalline silicon solar cells: effect of substrate temperature on cracks and their role in post-oxidation. M. Python*, D. Domine?, **Amorphous and Microcrystalline Silicon Solar Cells: Ruud E.I.** Thin film solar cells in a p-i-n structure with an absorbing layer of intrinsic hydrogenated microcrystalline silicon (?c-Si:H) deposited through plasma enhanced **High-efficiency microcrystalline silicon solar cells on - IOPscience** MICROCRYSTALLINE SILICON SOLAR CELLS: THEORY AND DIAGNOSTIC TOOLS. Fanny Meillaud, Arvind Shah, Julien Bailat, Evelyne Vallat-Sauvain, **Effects of Substrate Surface Morphology on Microcrystalline Silicon** Hydrogenated microcrystalline silicon (? c -Si:H) thin-film solar cells were prepared at high rates by very high frequency plasma-enhanced chemical vapor **Microcrystalline silicon layers for thin film solar cells - JuSER** Microcrystalline Silicon Solar Cells with 10.5% Efficiency Realized by High-efficiency thin-film silicon solar cells realized by integrating stable **Optical simulations of microcrystalline silicon solar cells applying** Thin film solar cells in a p-i-n structure with an absorbing layer of intrinsic hydrogenated microcrystalline silicon (?c-Si:H) deposited through plasma enhanced **High-efficiency microcrystalline silicon single-junction solar cells** 11.0%-Efficient Thin-Film Microcrystalline Silicon. Solar Cells With Honeycomb Textured Substrates. Hitoshi Sai, Takuya Matsui, Koji Matsubara, Michio Kondo, **Microcrystalline silicon solar cells: effect of - Infoscience - EPFL** Microcrystalline Silicon for. Thin-Film Solar Cells. Microkristallijn silicium voor dunnefilmzonnecellen. (met een samenvatting in het Nederlands). **Microcrystalline silicon solar cells**

deposited using a - Scitation microcrystalline silicon solar cell, with a conversion efficiency of solar cells microcrystalline nanocrystalline silicon thin-film high efficiency. **High-efficiency microcrystalline silicon solar cells on - IOPscience** Amorphous and Microcrystalline Silicon Solar Cells. Gavin Conibeer2 and Arthur Willoughby3. R.E.I. Schropp. Published Online: . **Nanocrystalline silicon - Wikipedia Material and solar cell research in microcrystalline silicon** We investigate microcrystalline-silicon (?c-Si) solar cells with photonic crystals on the top surface, which exploit the large-area resonant effect. **Photonic crystal microcrystalline silicon solar cells - Wiley Online 11.0%-Efficient Thin-Film Microcrystalline Silicon Solar Cells With** Abstract: Topic of this thesis was the development of thin film solar cells based on microcrystalline silicon prepared by 13.56 MHz PECVD (plasma-enhanced **Microcrystalline Silicon Solar Cells Prepared by 13.56 MHz - JuSER** ABSTRACT. This short communication highlights our latest results towards high-efficiency microcrystalline silicon single-junction solar cells. **Amorphous and Microcrystalline Silicon Solar Cells: Preprint - NREL** haft. Amorphous and microcrystalline silicon applied in very thin tandem solar cells. Sandra Schicho. Sandra Schicho. V ery thin silicon tandem solar cells **microcrystalline silicon solar cells: theory and - Infoscience** High-efficiency microcrystalline silicon solar cells on honeycomb textured substrates grown with high-rate VHF plasma-enhanced chemical **Amorphous and microcrystalline silicon applied in thin tandem solar** Low pressure chemical vapour deposition (LP-CVD) ZnO as front transparent conductive oxide (TCO), developed at IMT, has excellent light-trapping properties for a-Si:H p-i-n single-junction and micromorph (amorphous/microcrystalline silicon) tandem solar cells. **Microcrystalline-Silicon Solar Cells With Photonic Crystals on the** Nanocrystalline silicon (nc-Si), sometimes also known as microcrystalline silicon (?c-Si), is a The main application of this novel material is in the field of silicon thin film solar cells. As nc-Si has about the same bandgap as crystalline silicon, **Microcrystalline silicon solar cells deposited using a - AIP Publishing** Enhancing the absorption of thin-film microcrystalline silicon solar cells over a broadband range in order to improve the energy conversion **Thickness dependence of microcrystalline silicon solar cell properties** This paper addresses the performance of pin and nip solar cells with microcrystalline silicon (?c-Si:H) absorber layers of different thickness. Despite the rev. **none** Amorphous silicon solar cell technology has evolved considerably since the first amorphous silicon solar cells were made at RCA Laboratories in 1974. **Microcrystalline Silicon for Thin-Film Solar Cells - Utrecht University** The StaeblerWronski effect or light-induced degradation effect is prevalent among all types of amorphous silicon (a-Si:H) layers and solar cells produced so far. It came therefore as a surprise that microcrystalline silicon (?c-Si:H) solar cells generally do not show any light-induced degradation. **Microcrystalline Silicon Solar Cells with 10.5% Efficiency Realized** Amorphous and Microcrystalline Silicon Solar Cells: Modeling, Materials and Device Technology of Solar Cells Modeling of Amorphous Silicon Solar Cells **Potential of amorphous and microcrystalline silicon solar cells** The relationship between c-Si:H solar cell performance and surface morphology of substrate is studied systematically using textured-ZnO substrate which is **Amorphous and Microcrystalline Silicon Solar Cells: Modeling** Amorphous and Microcrystalline. Silicon Solar Cells. Preprint. April 1999 NREL/CP-520-29586. S. Wagner. Princeton University. D.E. Carlson. Solarex. **Amorphous and Microcrystalline Silicon Solar Cells: Preprint - NREL** polycrystalline silicon solar cells which consists of a 2 m thick layer of polycrystalline silicon with a very small grain size (microcrystalline silicon) formed by