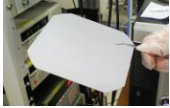


Researches on production of low-cost, highly efficient solar cells with film-interface control techniques

Professor Fumihiko Hirose

Fabrication process of solar cells with low-purity Si wafers



Starting material : low-purity Si with a metal concentration up to $10^{13}\sim 10^{16}/\text{cm}^3$.

Very cheap but poor power conversion efficiency of less than 3%!

YU original gettering

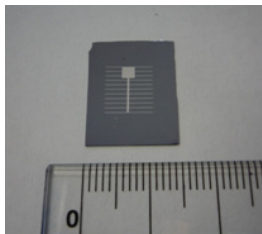
Improvement of carrier lifetime

Inactivation of grain boundary

PCE 13% achieved in 2009

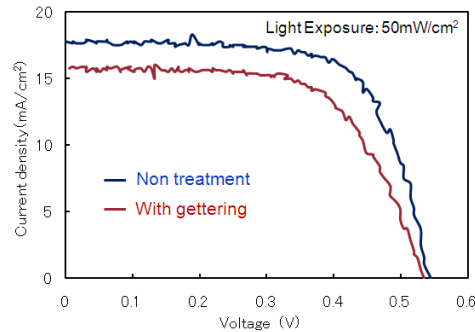
Passivation and light trap

Target : 17%



Solar cell sample

Power Generation Test of solar cells made of low-purity Si wafers



Treatment	Jsc(mA/cm ²)	Voc(V)	FF	PCE (%)
Non treatment	15.76	0.54	0.63	10.80
With Gettering	17.74	0.55	0.66	13.17



Semiconductor parameter analyzer

Content :

Recent years, solar cell technologies as clean energy sources have been attracting much attention because of problems from the global warming. In our laboratory, we have studied on **low-cost Si solar cells made of low-purity Si, dye-sensitized and bulk heterojunction organic solar cells.**

What is unique is that we plan the development based on the spectroscopic investigation on the photovoltaic film-interfaces since we can easily determine the rate-limiting factor for power generation and obtain effective measures for the improvement without many tries and errors. We possess IR absorption and x-ray photoelectron spectroscopy as the spectroscopic tools. We achieved PCEs of 13 and 9.6 % with low-purity Si and dye-sensitized solar cells, respectively.

In our laboratory, students can learn not only solar cell technologies, but also semiconductor production, evaluation and the related simulation. After graduation, most of them have got jobs in semiconductor makers.

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