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Energy Colloquium

Defect Engineering for Silicon Photovoltaic

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Technopark, Building 3, Room 402

ABSTRACT:

According to the present-day expertise, in 30-40 years the only way to solve a problem of producing enough electricity for humans will be a wide use of solar photovoltaic cells. During recent 20 years, a production of solar cells grows exponentially. It doubles every two years. In 2016 the total power of installed solar cells exceeded 200 GWatts. More than 90% of solar cells are now producing from crystalline silicon which seems to be an optimal material for that.

However, for really prevailing use of photovoltaic modules for energy generation we must further decrease their cost. There is considerable effort to reduce the cost of Si cells by using inexpensive mc -Si wafers produced by block casting or other even cheaper growth techniques. Also, a metallurgical-grade silicon feedstock of reduced purity is currently being explored with the goal to further reduce material expenses. The major drawback of such inexpensive Si wafers is their high density of extended defects and impurities. Those defects can be effective centers of the electron-hole recombination reducing significantly solar cell efficiency. The only way to produce good solar cells from such inexpensive wafers is to use so-called “defect engineering”. “Defect engineering” allows controlled modification of electronic properties of defects in desirable direction using the knowledge about interactions and reactions of various defects and impurities. It is an important part of modern solar cell technology. In this talk we consider a present-day situation with “defect engineering” in Si for solar cells.

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