

VIII Всеукраїнська студентська науково - технічна конференція "ПРИРОДНИЧІ ТА ГУМАНІТАРНІ НАУКИ. АКТУАЛЬНІ ПИТАННЯ"

Секція:

Гуманітарні науки

УДК 678:621.383.51

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ПОЛІМЕРНІ СОНЯЧНІ БАТАРЕЇ

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POLYMER SOLAR CELLS

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Ключові слова: полімерні сонячні батареї.

Keywords: Polymer solar cells.

A polymer solar cell is a type of flexible solar cell made with polymers, large molecules with repeating structural units, that produce electricity from sunlight by the photovoltaic effect. Polymer solar cells include organic solar cells (also called "plastic solar cells"). They are one type of thin film solar cell, others include the more stable amorphous silicon solar cell.

Most commercial solar cells are made from a refined, highly purified silicon crystal, similar to the material used in the manufacture of integrated circuits and computer chips (wafer silicon). The high cost of these silicon solar cells and their complex production process generated interest in alternative technologies.

Polymer solar cells have for a long time lagged behind traditional solar cells on both performance and stability. However, they have always had a potential advantage; that is their ability to be produced from solution. This means that they can be printed or coated, instead of using expensive vacuum deposition as for the first generation silicon solar cells. Today, performances of 10% have been demonstrated for polymer solar cells. The lifetime has also improved considerably and plastic solar cells with a shelf life of several years have been demonstrated. In addition, large scale production of polymer solar cells is today to some extent a reality, as demonstrated by for example the freeOPV initiative.

Compared to silicon-based devices, polymer solar cells are lightweight (which is important for small autonomous sensors), potentially disposable and inexpensive to fabricate (sometimes using printed electronics), flexible, customizable on the molecular level and potentially have less adverse environmental impact. Polymer solar cells also have the potential to exhibit transparency, suggesting applications in windows, walls, flexible electronics, etc. An example device is shown in Fig. 1. The disadvantages of polymer solar cells are also serious: they offer about 1/3 of the efficiency of hard materials, and experience substantial photochemical degradation

Polymer solar cells inefficiency and stability problems, combined with their promise of low costs and increased efficiency made them a popular field in solar cell research. As of 2015, polymer solar cells were able to achieve over 10% efficiency via a tandem structure.