

Importance of the photo Electrochemical solar cell (PEC solar cell)

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Abstract

It is the crying need of the day to search out alternative source of energy to meet the national as well as international energy crisis. As the conventional sources of energy are being exhausted at a faster rate, so the world has been facing energy crisis. To meet this crisis we have to use nonconventional source of energy such as (i) nuclear energy (ii) wind energy (iii) solar energy (iv) Biomass energy and so on, Out of these various sources, it is very easy, convenient and inexpensive to harness the solar energy which is ample in amount and non exhausting, so our aim is to transfer this solar energy into electrical energy with the help of solar cells. Among various solar energy, converter the wet solar cell which is photo Electrochemical solar cell due to low cost and ease of fabrication in mass production and having good power conversion efficiency and also pollution free depending on low energy band gap electrode. The graph for better semiconducting material for PEC solar cell lies in the fact that low band gap material corrodes in electrolyte. Several investigator have fabricated PEC solar cells using tungsten trioxide, dioxide, monoxide, tin mono sulphide, cadmium telluride and so on. But it is seen that transparent film of S_nO_2 having considerably large band gap as alternative for fabricating PEC solar cell as it is non-corrosive in nature.

It is obtained that tin oxide material as an electrode and selecting S_nCl_4 as its electrolyte, PEC solar cell can be fabricated to give better power conversion efficiency with considerable amount.

The whole world is going ahead to harness the solar energy into different uses such as defence, industries and in research laboratories via photo electro chemical solar cell.

Key words : Photo electrode, energy band gap, conversion efficiency.

References:-

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2. Electronic for you (Journal) vol.-Nov.-2008, P-1617
3. H. hovel, "semiconductors & semimetals, volume II, solar cells" Academic press, N.Y. 1975.
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INTRODUCTION

The energy in our society has become necessity for the development of a civilized as well as weaker section population of the society. Mahatma Gandhi's advice was "the earth has enough resources to meet the need of the people, but will never have enough to meet the greed & energy crisis of the people by harnessing the renewable sources of energy. According to National Action Plan of the country, "Energy is an important input for economic development. The exploitation and development of various forms of energy and making energy available at affordable rates is of our major thrust areas."

Types of Energy Sources:

There are two types of energy sources :

- (i) Conventional sources (Non-renewable Energy)
- (ii) Non-conventional sources (Renewable energy sources)

(i) Conventional Sources :

The conventional sources of energy are fossil fuels such as natural gases, oil, coals, wood etc. These are non-renewable capital sources of energies. These are being consumed day to day in our various uses at a tremendous rate with rapid growth of industries and various technologies that are being developed in our countries and in the world too that is this crisis is global.

(ii) Non- Conventional Sources : These are

- (i) Wind Power Source.
- (ii) Bio-mass Energy.

(iii) Nuclear Energy.

(iv) Solar Energy Source.

Out of these various sources, it is very easy, convenient and inexpensive to harness the solar energy which is ample in amount and non exhausting, so our aim is to transfer this solar energy into electrical energy with the help of solar cells.

PEC Solar cell (Photo electrochemical solar cell)

The application of semiconducting electrode based photo electrochemical (PEC) solar cells for the conversion of solar energy to electricity depends on the discovery of cheap and abundant materials having high intensity of solar spectrum which is capable of stable operation. There has been active quest for the new semiconductor material for PEC solar cell which could meet the following requirements.

- (i) Suitable bound gap (2.5 to 5 eV)
- (ii) Chemical stability in acidic medium
- (iii) Less expensive
- (iv) More stable against photo conversion.

Several investigator have fabricated PEC solar cells using tungsten trioxide, dioxide, monoxide, tin mono sulphide, cadmium telluride and so on. The present study is based on the characterization of photo electrochemical solar cells using Tin oxide ($S_n O_2$) as electrode,

having considerably large band gap as alternative for fabricating PEC solar cell as it is non- corrosive in nature.

Characteristic factor of PEC solar cell

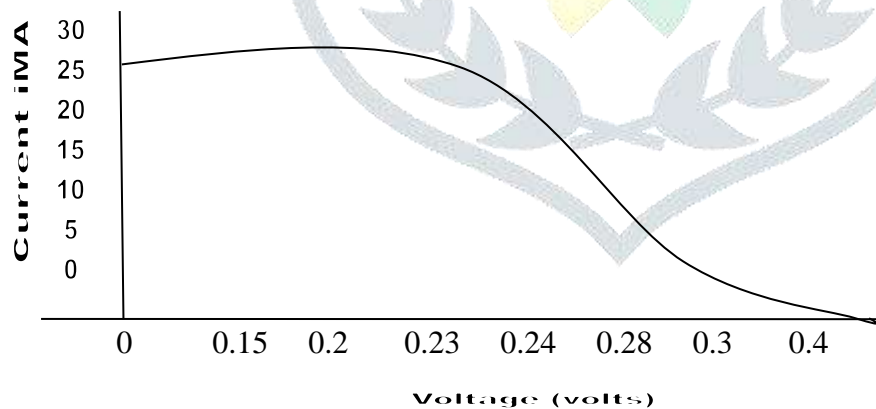
The performance of the PEC solar cell has been carried out by using $S_n O_2$ as electrode and $S_n Cl_4$ (Stannous chloride) as electrolyte. The performance of the cell has been studied. The polarity has been observed to be consistent with open circuit voltage (V_o/c) and short circuit current ($I s/c$) with the help of the circuit. The result obtained and placed in table.

Table

S.No.	Voltage (volts)	Current (mA)	Vmax (volts)	I max (mA)
1.	0.00	25.5		
2.	0.10	25.4		
3.	0.15	25.4		
4.	0.20	25.4	0.26	22.0
5.	0.23	25.3		
6.	0.24	22.0		
7.	0.28	10.0		
8.	0.30	0.35		
9.	0.34	0.00		

POWER CONVERSION EFFICIENCY

By plotting the voltage on X-axis and current on Y-axis, power characteristic of S_nO_2 PEC solar cell has been drawn as shown in graph.

**CONCUSION**

As S_nO_2 film is more promising for its use in PEC solar cell, the low conversion efficiency can be improved. In the present work tin-oxide with trans conducting film has been chosen to obtained better

performance & less expensive compared to other. There is large scope for this transparent conducting oxide film to convert solar energy to electricity via photo electrochemical solar cell.

The whole world is going ahead to harness the solar energy into different uses such as defence, industries and in research laboratories via photo electro chemical solar cell.

References:-

1. Power line (Journal vol-5)- April 2008, P-72-81, New Delhi.
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