**Subject:**

In school books as well as in University text books one can find the assertion that in a solar cell the electric potential gradient in the space charge layer of the \textit{pn} junction is the cause of the electric current generated by the cell:

“The separation of electrons and holes caused by the internal electric field within the depletion layer represents the generator effect.”

“Due to electric forces the liberated electrons are pushed into the \textit{n} layer and the holes into the \textit{p} layer.”

**Deficiencies:**

On a cursory inspection the statement seems plausible. The electric current caused by the solar cell needs a cause or a kind of driving force. Physicists know that an electric field represents such a cause. There is indeed an electric field within the diode, and its direction is the one that we need. Therefore, the physicist concludes, this field or the corresponding potential gradient is responsible for the electric current. Unfortunately the physicist has overlooked another fact. Never an electric potential gradient can be the cause of a stationary electric current. If we follow a (positive) charge carrier on its trajectory in the circuit, we observe that it goes just as much uphill (the potential hill) as downhill. Since in the load resistance it goes downhill, in the energy source it must necessarily go uphill. One can precisely recognize the energy source by the fact that the electric potential is higher at the terminal where the (positive) charge comes out than at the terminal where it enters the source.

The fact that on some sections within the energy source the charge goes downhill does not rebut the argument. In an electric circuit the electric potential changes each time that the material of the conductor changes. It does so in any conductor, even in a circuit without a battery. These potential steps add up to zero when going once around the whole circuit. That is why there is no need for care about this phenomenon.

**Origin:**

Again the desperate attempt to explain the working principle with the familiar tools of electricity, although with precisely these tools it can be seen that the argument is not correct.

**Disposal:**

The cause or driving force for a current of electric charge carriers can but must not be an electric potential gradient. Actually the cause of the electric current in the solar cell is a gradient of the chemical potential. Thus the solar cell is a close relative of the electrochemical cell.

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