Dutch researchers raise energy yield of 'cheap' solar panels

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Researchers from TU Delft in the Netherlands have shown how the energy yield of relatively cheap solar panels, made of amorphous silicon, can be considerably raised: from around 7 percent to 9 percent.

Researcher Gijs van Elzakker focused on solar panels that are made from so-called amorphous silicon, as opposed to the more commonly used crystalline silicon. Amorphous silicon has the great advantage that the solar panels can be produced relatively cheaply using a very thin layer of silicon (thin film solar cells).

The major disadvantage of solar panels made with amorphous silicon is that their yield is relatively low. While crystalline silicon achieves a yield of around 18 percent, amorphous silicon, until recently, remained at around 7 percent. This is partly because the amorphous silicon panels suffer from the so-called Staebler-Wronski effect. This phenomenon, which has still not been fully explained by science, manifests itself in the first hours that the panels are exposed to sunlight. Because of this the yield falls by around a third, from around 10 percent to around 7 percent.

In his doctoral research Gijs van Elzakker investigated adaptations in the production process that could raise the yield. The silicon layer in the solar panels he studied is made of silane gas (SiH_4). The structure of the silicon layer can be changed by diluting this silane gas with hydrogen during the production process. The use of hydrogen appears to enable the reduction of the negative Staebler-Wronski effect.

Van Elzakker concentrated, among other factors, on the proportion of hydrogen to silane gas. He determined the optimum ratio of hydrogen to silane in the production process. Van Elzakker: "We showed that the influence of the Staebler-Wronski effect can be considerably reduced in this way. If this knowledge is applied in the manufacture of this type of solar cells, a yield of 9 per cent can be expected."

Gijs van Elzakker's findings are already being applied on the production line of the German company Inventux Technologies, where he now works.

More information: Gijs van Elzakker will obtain his PhD on this subject from TU Delft on Tuesday 6 July.

Provided by Delft University of Technology