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Self-Assembling Solar Cells Take Cue From Salad Dressing

by Matthew McDermott, New York, NY on 01.13.10

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photo: John Mayer via Flickr.

The principle behind these self-assembling solar cells is one which I imagine every person who reads this is familiar with: Until you mix it together salad dressing stays neatly separated. Now take that idea--the hydrophobic and hydrophilic qualities of two liquids--apply it to manufacture of solar cells and you get a glimpse of the genius of this. Heiko Jacobs and Robert Knuesel, writing in *Proceedings of the National Academy of Sciences*, demonstrate that it can be done. The quick version goes like this:

Components Dredged Through Liquid Conveyor Belt

A blank is manufactured with pre-cut spaces in it for the individual solar cell elements. These depressions are lined with low-temperature solder. The individual elements, just a few tens of millionths of a meter across, are gold and silicon stacks. The silicon side has a hydrophobic molecule put on it, so it is attracted to water. The gold side has a hydrophilic molecule on it, so it is attracted to water.

These stacks are placed in a what is essentially an oil and water mixture. Because of the coatings on them they float on the boundary between the two liquids.

This is all on a conveyor belt arrangement, through which the blank is dragged. As it emerges the stacks get drawn neatly into the depressions as the gold is attracted to the solder.



photo: fdecombe via flickr.

Previous Attempts Just Used Gravity Assembly

Co-author Heiko Jacobs told the BBC they had tried for two years to develop a method for self-assembly just using gravity--the components settling down like sand settling onto the bottom of a river or lake--but it wasn't working. "Then we thought if we could concentrate them into a two-dimensional sheet and then have some conveyor belt-like system we could assemble them with high yields and high speed."

How fast is high speed? The system currently produces a working device with 64,000 elements in three minutes.

More: [Self-assembly of microscopic chiplets at a liquid-liquid solid interface forming a flexible segmented monocrystalline solar cell](#)

Solar Power

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Good article but the definitions for hydrophilic and hydrophobic should be checked. As written the article states that they are the same but they are opposite. Minor but still a good article.

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[rckoegeel](#) 1 day ago

no reference to how fast the process is currently, makes three minutes sound like forever. also, don't post ruff drafts, this article though still interesting, is full of holes.

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