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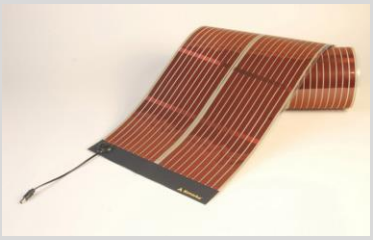
Size Control of Conductive Polymer Domains in Organic Solar Cells.

Breakthrough efficiencies will propel this exciting new photovoltaic technology.



www.gizmag.com

High efficiency polymer solar cells will lower the cost of electricity and create new markets and applications for PV.

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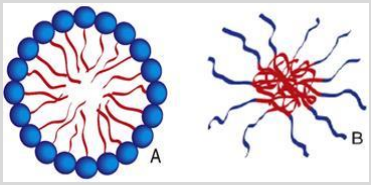
Problem Statement:

Organic/polymer solar cells are relatively new, offering many advantages compared to inorganic-based technologies. (Si, CdTe and CIGS). Organic solar cells are processed from readily available materials in simple solution roll-to-roll printing processes and thus are inexpensive, mechanically flexible, and amenable to large-scale production. They are also up to 70% transparent. These advantages make them ideal for integration into distributed, powered devices, and window applications in addition to fixed roof and ground installations. Currently, organic solar cells are limited by relatively low efficiencies, but a plethora of research activities including at Sandia promises to bridge the gap.

Approach:

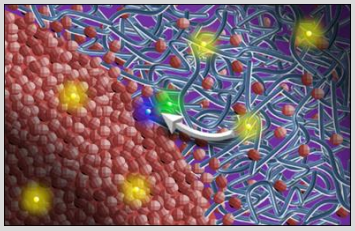
The slow diffusion of excitons is blamed for low efficiencies and has been addressed by improving purity of materials, but recent research shows that efficiency is increased by controlling domain sizes as well. Smaller domains allow excitons to reach the donor-acceptor interface before re-combination. Our approach is to revolutionize organic solar cell fabrication using Sandia's combined expertise in nano-materials, polymer chemistry, and solar photovoltaics. We will use Sandia-developed micelle-based solution templating reactions to make and size control smallest-possible domains of conductive polymers in bulk heterojunction solar cells.



www.pharmainfo.net

Impact:

Organic/polymer solar cells are leading edge R&D and so promise next-generation advancement of PV technologies. By increasing the efficiency of polymer-based PV cells, we will make them useful for military applications where weight, ease-of-use, disposability, and camouflaging is important and also in conventional uses such as power generating windows in vehicles and architecturally-pleasing buildings.



www.photonics.com

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