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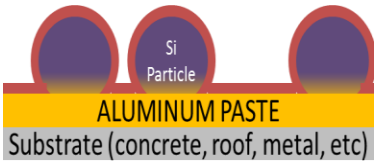
Paintable Photovoltaics

A Step-By Step Approach for Spreadable PV Deposition



Paintable photovoltaics promise to expand the use of solar power through cost reductions and easy installation on light-exposed surfaces unsuitable for current commercial technologies.

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Problem Statement:

Current commercial photovoltaic modules made from crystalline silicon and thin films are manufactured in a factory and then installed on rooftops or on the ground by professional solar installers. This costly and time consuming process requires assembly mostly by factory workers in Asia, transport of bulky modules from the factory to installation sites, significant advance site preparation, and installation labor paid at electrician's rates. Under this current solar adoption process, it is difficult to establish a profitable, unsubsidized way for companies to increase the US energy supply contribution of photovoltaics from less than 0.1% today to 30% in the foreseeable future.

Approach:

Sandia envisions the development of photovoltaics in the form of spreadable paints. We have conceived a step-by-step approach to fabricate microscale doped single crystalline silicon, incorporate the crystals into a paint matrix, and demonstrate PV paint deposition methods. Microscale silicon is produced from dried slurry waste and from microwave assisted solution growth from amine precursors. N-doped silicon crystals are dispersed into a conductive paint matrix and applied using spray, spin, dip, and inkjet coating methods. The paintable PV is integrated into products manufactured in a factory or is provided to painters to "install" photovoltaic arrays on a multitude of light-exposed surfaces including those that are physically or aesthetically unsuitable for hosting current commercial photovoltaic products. Through the formulation of a recipe to make photovoltaic paints, Sandia is pioneering a US industry for this next generation technology.

Impact:

Paintable photovoltaics will create a new product line for U.S. coating companies that already dominate the global industry, will allow the painting profession to become a growing domestic occupation for nationwide solar installations, and will expand penetration of solar energy to surfaces everywhere.

U.S. DEPARTMENT OF ENERGY | NNSA National Nuclear Security Administration

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