



## TECHNOLOGY

# High Efficiency Photovoltaics Through Engineering Spontaneous Emission

## OVERVIEW

### Background

In the field of thin film photovoltaic (PV) cells, GaAs and Si are the most common solar cell materials utilized. A solar cell must operate at a high current and voltage in order to obtain a high efficiency. The maximum achievable voltage depends upon minimizing radiative and non-radiative recombination within the cell. A high quality semiconductor like GaAs, non-radiative recombination can be minimized to where the photovoltaic efficiency is limited by radiative emission from the cell.

### Innovation

Researchers at the University of Maryland propose to create a thin film PV device (less than 500 nm) that will improve output voltage and efficiency by engineering the spontaneous emission rate using photonic crystal structures. Engineering the structures leads to higher photovoltaic efficiencies via the higher voltage level of the device. In an application such as solar cells whereby slight efficiency improvements constitute noteworthy news, this innovative approach will provide a substantial increase in efficiency over the current competition.

## APPLICATIONS

- Photovoltaic cells used in many areas

## ADVANTAGES

- Substantially more efficient – improvements on the order of 10%, considered to be disruptive in this field
- Reduced weight in the devices
- Reduced cost of the devices

## CONTACT INFO

UM Ventures  
0134 Lee Building  
7809 Regents Drive  
College Park, MD 20742  
Email: [umdtechtransfer@umd.edu](mailto:umdtechtransfer@umd.edu)  
Phone: (301) 405-3947 | Fax: (301) 314-9502

## Additional Information

## INSTITUTION

University of Maryland, College Park

## EXTERNAL RESOURCES

PS-2012-070