

TECHNOLOGY SOLUTION

Power Generation and Storage

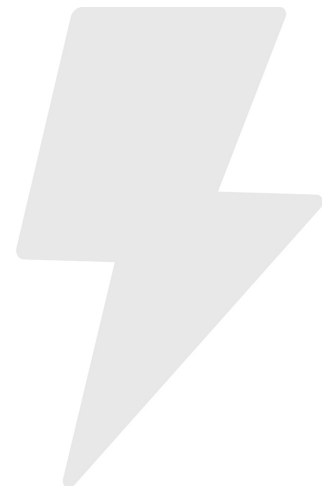
Solar Powered Carbon Dioxide (CO₂) Conversion

[A low-cost nanomaterial thin-film device](#)

NASA has developed a new technology that can convert the greenhouse gas carbon dioxide (CO₂) into fuel by using solar-powered, thin-film devices. Metal oxide thin films are fabricated to produce a photoelectrochemical cell that is powered by solar energy. By converting CO₂ to fuel before it is emitted to the atmosphere this technology can mitigate the effects of the burning of fossil fuels, the world's major fuel source for the foreseeable future. This new nanomaterial thin-film device provides a low cost, facile fabrication pathway to commercialize the technology in the sustainable energy market. More importantly, it results in a zero carbon footprint by recycling CO₂ to fuels that are compatible with all existing fuel utilities. This is accomplished by using solar power to convert the CO₂ into a useable fuel in a very compact device.

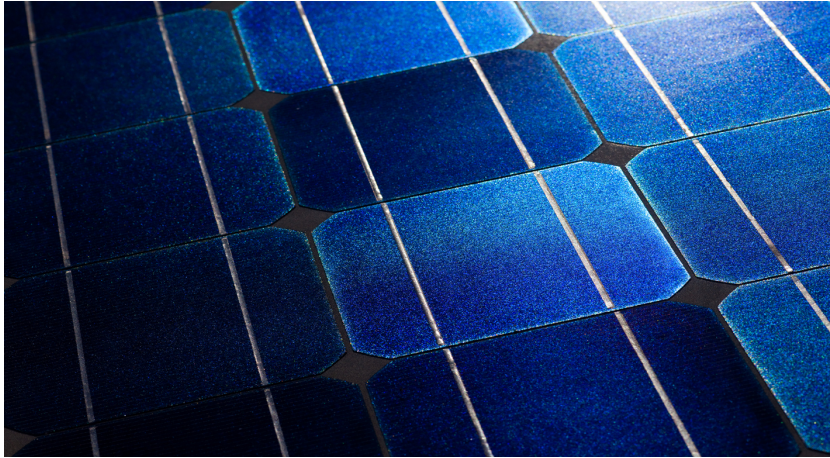
BENEFITS

- Efficient conversion of carbon dioxide
- High efficiency sustainable energy usage
- Inexpensive operations
- Versatile
- PV integrated device platform
- Reduced emissions
- Useful fuels produced
- Uses solar energy as the only power source



THE TECHNOLOGY

This technology consists of a photoelectrochemical cell composed of thin metal oxide films. It uses sunlight (primarily the ultraviolet (UV), visible and Infrared (IR) portions)) and inexpensive titanium dioxide composites to perform the reaction. The device can be used to capture carbon dioxide produced in industrial processes before it is emitted to the atmosphere and convert it to a useful fuel such as methane. These devices can be deployed to the commercial market with low manufacturing and materials costs. They can be made extremely compact and efficient and used in sensor and detector applications.



Photovoltaic panels

APPLICATIONS

The technology has several potential applications:

- Carbon capture technologies
- Photoelectrochemistry
- Automobile industry
- Materials Science

PUBLICATIONS

Patent No: 9,528,192