Photo Rechargeable Li-Ion Battery

Tech ID: 32718 / UC Case 2019-148-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20230378572	11/23/2023	2019-148

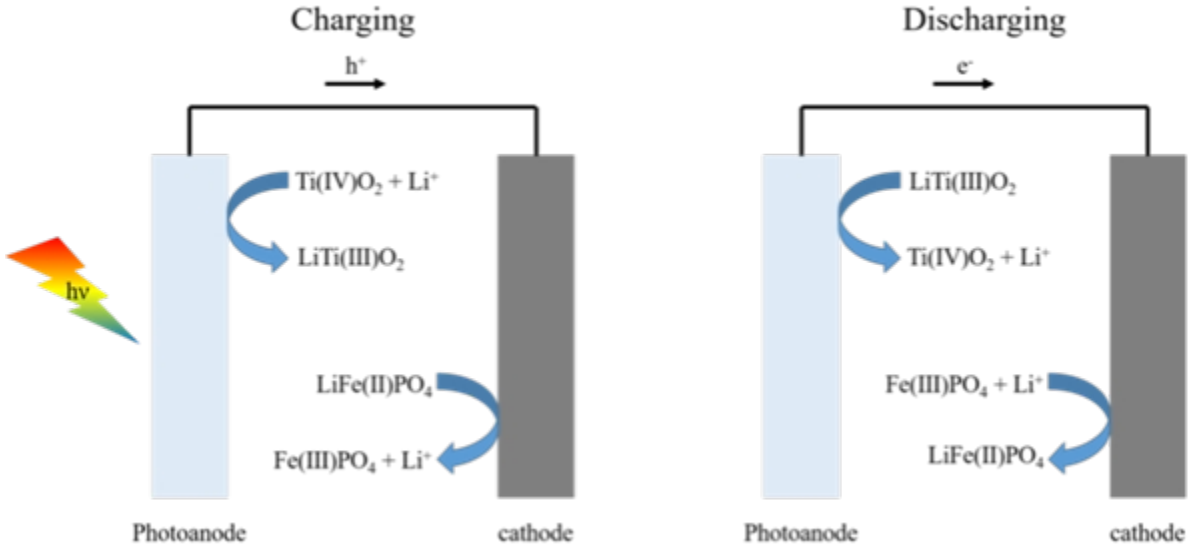
FULL DESCRIPTION

Background

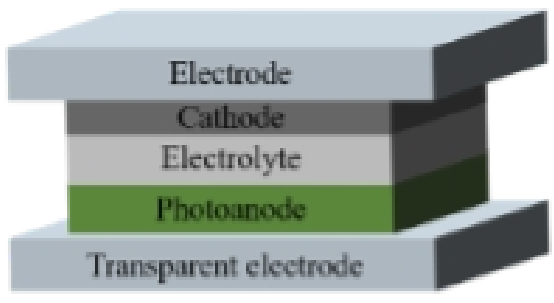
Energy generation using photovoltaic cells (PV), i.e., Solar Energy, is highly dependent on the time of day, season and environmental and weather conditions. To add value to solar cells, PV panels are combined with energy storage systems such as rechargeable batteries to improve the reliability and dispatchability of solar systems. In addition to energy losses (as a result of usage of separate system components) these integrated solar systems also require battery management systems and energy management systems that complicate the overall architecture of the solar system as well as its operation and maintenance requirements.

Invention

Prof. Alfredo Martinez-Morales and his team have invented a novel photo-rechargeable battery – essentially a lithium-ion battery with the functionality of solar energy generation. The innovative architecture and the specific selection of material layers exhibits the properties of a solar cell device and is capable of charging the battery via the photovoltaic effect. The invention, a Solar Battery, is a layered structure consisting of a photo-anode, electrolyte, and cathode sandwiched between a transparent and a regular electrode.



Schematic diagram of the charging and discharging process.



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OTHER INFORMATION

KEYWORDS

Solar energy, Energy storage, Lithium ion battery, Renewable energy, Photovoltaics

CATEGORIZED AS

- **Energy**
  - Solar
  - Storage/Battery
- **Engineering**
  - Engineering

RELATED CASES

2019-148-0

Layered structure of the developed solar battery.

ADVANTAGES

The uniqueness and significance of this invention are:

- Increased solar cell plus battery system efficiency.
- Reduced cost and complexity of solar cell plus battery systems.
- Cost effective fabrication in an open air environment.
- Does not require separator or conductive foil.
- Solar power that is dispatchable within a single device architecture.
- Increased power output by combining solar power and battery output together.
- Faster recharging of battery by combining solar charging with an external charger.

STATE OF DEVELOPMENT

Lab level prototypes have been built. Team currently scaling up and optimizing structure and design of the battery.

RELATED INVENTIONS

Please see all inventions at UCR in energy storage

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