Washington University in St. Louis
Office of Technology Management

TUNING OF PHOTO-ABSORPTION IN SEMICONDUCTORS, PHOTOCONDUCTORS, AND OTHER PHOTO CONVERSION SYSTEMS USING MAGNETIC FIELDS

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Background: The idea of creating clean, sustainable power in high amounts from renewable energy sources is an interest among many across the globe. One of the many ways of creating renewable energy is applying the photovoltaic effect, the conversion of solar to electrical energy, by using semiconductor material that converts absorbed sunlight to stored electrical current. However, only 5-25% efficiency is achieved by technologies currently on the market; therefore, there is a need to create a technology that better utilizes solar energy for the conversion to electricity.

Technology Description: Researchers at Washington University in St. Louis have designed a technology that uses a magnetic field on the light-sensitive conducting material to enhance the absorption of sunlight. Specifically, this magnetic interaction shifts the absorption wavelength of the semiconductor to increase light absorption at particular wavelengths. In multi-junction solar cells—cells that are made from multiple layers that absorb light in different ranges-- such magnetic field interactions lead to the opportunity to “tune” the light-absorbing properties of those layers. Additionally, Dr. Hayes and colleagues have also directed a method that increases photo-absorption at specific wavelengths with the use of magnetic fields.

Key Advantages:

- Enables higher conversion rate of sunlight to electrical power
- Better utilizes the applied sunlight onto the semiconductor