Antenna-Based Power Generation with Nanoscale Rectifying Elements

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a nanoscale power generation structure for antenna-based power generation.

OVERVIEW

"Rectennas" are antennas that can receive radio signals and rectify them to generate electrical power for wireless power transfer. Potential applications for rectennas range from large-scale power transfer applications to small applications such as powering RFID tags or biomedical implants.

The usefulness of rectennas is limited by the rectifying element, which must convert the electromagnetic (AC) signal to a signal with a non-zero average (DC). In addition, standard junction semiconductors that are sometimes used for rectification are relatively inefficient and are unable to extract power from low density signals. A need exists for improved rectifiers to make power generation from electromagnetic signals viable, especially in the area of small power transfer applications.

THE INVENTION

UW-Madison researchers have developed a new power generation structure based on the quantum mechanics of nanostructures. A coupled pair of nanopillars serves as the rectifier in a rectenna for power generation. The rectified electromagnetic signal is used to transfer electrons, which leads to the buildup of voltage. Embedding these nanoscale rectifiers in broadband antennas creates rectennas with the ability to scavenge energy from the radio frequency to optical frequency range. Rectennas with nanoscale power generation devices have the potential to be used as a universal power source.

THE WARF ADVANTAGE

Since its founding in 1925 as the patenting and licensing organization for the University of Wisconsin-Madison, WARF has been working with business and industry to transform university research into products that benefit society. WARF intellectual property managers and licensing staff members are leaders in the field of university-based technology transfer. They are familiar with the intricacies of patenting, have worked with researchers in relevant disciplines, understand industries and markets, and have negotiated innovative licensing strategies to meet the individual needs of business clients.

APPLICATIONS

- Power generation through rectification of electromagnetic signal
- Large-scale applications such as transfer of power from earth-based stations to satellites
- Small-scale applications such as RFID tags and biomedical implants like pacemakers

KEY BENEFITS

- Substantially more efficient power generation performance, particularly at low power density signals
- Utilizes common electromagnetic signals (radio waves, cell phone communication frequencies) as a power source
- Consists of silicon that is 10 times less expensive than materials in conventional solar cells

STAGE OF DEVELOPMENT

The development of this technology was supported by WARF Accelerator. WARF Accelerator selects WARF's most commercially promising technologies and provides expert assistance and funding to enable achievement of commercially significant milestones. WARF believes that these technologies are especially attractive opportunities for licensing.

ADDITIONAL INFORMATION

Related Portfolios
WARF Accelerator Program Technologies

Tech Fields
Clean Technology - Energy delivery
Semiconductors & Integrated Circuits - Components & materials
Micro & Nanotech - MEMS & NEMS

CONTACT INFORMATION

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