PZT Phonon-Photon Resonance Energy Generator with Integrated TEG and TPV System in a Dodecahedral Configuration

Field of Invention

This invention relates to the field of energy generation, specifically to systems utilizing piezoelectric materials, thermoelectric generators (TEGs), thermophotovoltaic (TPV) cells, and resonance-based technologies for scalable, zero-emission energy production. The generator aims to convert mechanical and thermal energy into electrical energy using a unique multilayer design and dodecahedral geometric configuration for optimal performance and efficiency.

Background of the Invention

Conventional energy conversion systems, such as steam turbines or solar panels, often have limitations in efficiency and scalability. Recent advancements in materials science, specifically piezoelectric and thermoelectric materials, have opened new possibilities for converting mechanical vibrations and heat into electricity. This invention leverages these advancements by incorporating PZT (lead zirconate titanate), a graphene-based phononic structure, TEGs, and TPV cells to enhance energy conversion efficiency through coupled phonon-photon resonance in a geometrically optimized structure.

Summary of the Invention

The invention provides an energy generator that utilizes an 8.6 cm SiO_2 spherical core coated in graphene, followed by a PZT piezoelectric layer in a dodecahedral form. This multilayer structure is anchored to thermoelectric generator (TEG) tiles and encased by nanophotonic TPV cells. The design features a dodecahedron with 12 flat faces, where 6 laser beams and 6 SASER (Sound Amplification by Stimulated Emission of Radiation) sources are strategically positioned to target the core, facilitating the coupled resonance between phonon (mechanical) and photon (optical) energy modes. The design aims to achieve scalable energy output, ranging from 6 kW to 17 kW of power, with an input range of 1.1 kW to 10.5 kW for phonon and photon generation in the basic core configuration.

A 1 kg sphere system using an initial 5 kW input (for phonon and photon generation) could theoretically generate enough energy to power a regular home and maintain self-sustained functioning, assuming:

1. Power storage units (e.g., batteries or supercapacitors) store the excess energy generated for when demands fluctuate.
2. Voltage transformers convert the output to the appropriate levels needed for household use.

This is based on:

1. Efficient phonon-photon resonance coupling generating mechanical energy.
2. PZT layers convert mechanical energy into electricity.
3. TEGs and TPV cells capture waste heat and adding extra power.

Given the efficiency of the piezoelectric and thermophotovoltaic systems, the energy produced would likely be sufficient to meet typical household demands, especially if the system is optimized with power management in mind.

Detailed Description of the Invention

Core Structure

The core of the energy generator consists of an 8.6 cm diameter SiO_2 sphere, which acts as a substrate to support subsequent material layers. The SiO_2 sphere is selected for its mechanical properties, such as high compressive strength and thermal stability, providing a robust base for the resonant system.

Graphene Layer

A 3.4 nm graphene layer is applied to the SiO_2 sphere. Graphene's high conductivity and mechanical strength enhance the interaction of phonons and electromagnetic waves, providing efficient coupling between mechanical vibrations and thermal energy.

PZT Layer

Over the graphene layer, a 1.86 cm PZT layer is applied in the shape of a spherical dodecahedron. This layer serves as the primary piezoelectric element, converting mechanical resonance into an electric charge. PZT is chosen for its high piezoelectric coefficient and its ability to sustain strong electromechanical coupling under resonance conditions.

TEG Anchoring and Heat Conversion

Thermoelectric generator (TEG) tiles approximately 3 mm in thickness are used to anchor the PZT layer, forming an integral part of the overall dodecahedral structure. These TEG tiles serve to convert waste heat generated within the core into electrical energy, further improving the efficiency of the energy conversion process.

TPV Encasing

The entire dodecahedral structure is encased in a nanophotonic thermophotovoltaic (TPV) cell arrangement, which is positioned at an optimal distance to capture thermal radiation from the core and convert it into electricity. TPV cells are chosen for their ability to operate at high temperatures and efficiently convert thermal photons into electrical energy.

Phonon-Photon Coupling via SASER and Laser Sources

The dodecahedron is designed with 12 flat faces, six of which are subjected to laser radiation while the remaining six are subjected to SASER inputs. The combination of optical and mechanical resonance facilitates a standing wave structure that optimizes the energy extraction from both phonon and photon sources. The alternating SASER and laser configuration also ensures that both mechanical and optical resonance modes reach maximum coherence and energy conversion efficiency.

Scalability

The described design is scalable by altering the core size and layer configuration. For increased power output, the graphene and PZT layers can be doubled in number, and the size of the TEG tiles can be adjusted accordingly. The modular nature of the system allows for straightforward scaling from the basic 6 kW configuration to 17 kW or more by expanding the core dimensions and increasing the magnitude of resonance inputs.
Doubling the SiO_2 mass and adding alternating layers of graphene and PZT should increase the system's power output by roughly a factor of two or more, depending on the efficiency of the added layers.
As the core size increases, phonon resonance will be preserved across multiple layers, ensuring that the PZT layers continue to generate electricity efficiently. Increasing TEG tile size and thickness will improve heat recovery, and the additional heat generated from a larger SiO_2 core will be efficiently captured by the TEGs and TPV cells.
With careful tuning of layer thickness and resonance frequencies, this system could maintain high efficiency as it scales. In essence, energy output can be doubled from the basic configuration by scaling up the mass and adding additional layers.

Claims

1. An energy generation apparatus comprising:
    a. An SiO_2 spherical core;
    b. A graphene layer applied to the SiO_2 core;
    c. A PZT layer shaped as a dodecahedron;
    d. Thermoelectric generator (TEG) tiles anchoring the PZT layer;
    e. Nanophotonic thermophotovoltaic (TPV) cells encasing the structure;
    f. A plurality of laser and SASER sources configured to target alternating faces of the dodecahedron.
2. The apparatus of claim 1, wherein the SiO_2 sphere has a diameter of 8.6 cm, and the graphene layer is 3.4 nm in thickness.
3. The apparatus of claim 1, wherein the PZT layer is approximately 1.86 cm in thickness and shaped into a spherical dodecahedron.
4. The apparatus of claim 1, wherein the TEG tiles are approximately 3 mm in thickness, positioned to anchor the PZT layer, and serve to convert thermal energy to electrical energy.
5. The apparatus of claim 1, wherein the nanophotonic TPV cells are arranged at an optimal distance to convert thermal radiation from the core into electricity.
6. The apparatus of claim 1, wherein the system includes alternating laser and SASER sources, configured to create coupled phonon-photon resonance within the core structure.

Abstract

A scalable energy generator utilizing a dodecahedral configuration of PZT, graphene, TEG, and TPV cells. The system integrates phonon and photon resonance for efficient energy conversion, achieving zero-emission output. The core structure consists of an SiO_2 sphere layered with graphene and PZT, anchored by TEG tiles, and encased in TPV cells. Resonance is induced by alternating laser and SASER sources, optimizing mechanical and optical energy extraction. The design is modular and can be scaled from 6 kW to 17 kW or more.

Declaration

I hereby declare that I am the original inventor of the above-described invention, and I request that this provisional patent application be filed to protect its intellectual property rights.

Signature:
Jose Pereira Carlos
Date:
October 19, 2024