NASA SBIR/STTR Technologies

Efficient, Long-Lived Radioisotope Power Generator

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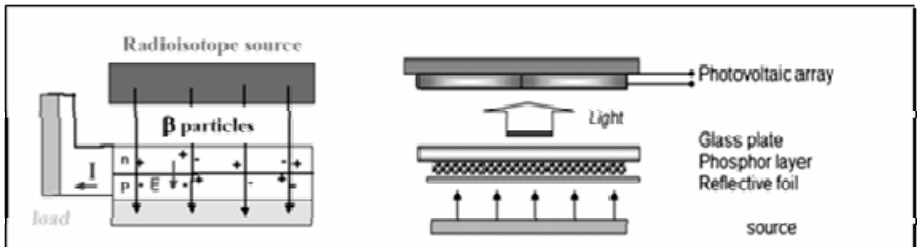
Contract No. NNX11CE12P

Identification and Significance of Innovation

- Betabatteries efficiently harvest the energy in radioactive beta emissions
  - Up to 2x Efficiency of RTG
- Direct conversion betabatteries are limited
  - Radiation damage to photodiode
  - Amount of radioisotope that can be used is limited
  - Much energy is lost to environment or inactive regions of photodiode
- Innovation – volumetric energy conversion approach
  - Higher power
  - More radiation tolerant than photodiodes
  - Scalable for higher power applications

TRL at the end of Phase I: 3



Traditional approaches to energy conversion in betabatteries are planar. RMD is proposing to develop a novel volumetric energy conversion approach.

Technical Objectives

Demonstrate that the proposed approach to betabatteries can meet the efficiency, expected lifetime, and power density targets.

Workplan

- Develop computer model for thermal and radiation transport - done
- Evaluate the type and quantity of radioisotope - done
- Examine issues such as radiation damage - done
- Select an appropriate photodiode - done
- Fabricate and test prototype energy conversion device – done

NASA Applications

- Long term (decades) reliable power source
- Deep space missions
- Lunar rovers
- Anywhere an RTG might be used

Non-NASA Applications

- Low power/small amounts of radioactive material
- Remote or inaccessible sensors: pipelines, deep sea, cargo containers
- Implantable medical equipment
- Trickle charging consumer devices

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NON-PROPRIETARY DATA