

Public Abstract

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Department:Nuclear Engineering

Degree:PhD

Title:Photon Intermediate Direct Energy Conversion Using a Sr-90 Beta Source

A compact, long-lived power source is desirable in many different applications. Here a proof of concept is presented using a radioactive source, a pressure chamber, a mirror wave guide that provides such a source of power that could work for more than 30 years.

10 mCi of strontium 90 (Sr-90) was tested under a pressure range from vacuum to 2400 psig in order to determine if the energy could be converted and how long a photovoltaic could last under close proximity to such a powerful radioactive source. After more than 150 hours of exposure time the photovoltaic showed no signs of damage and current was successfully generated from the system.

The overall efficiency of the system was very low, however, due to the mirror chamber being designed to protect the photovoltaic from being damaged by the beta radiation rather than optimizing for photon transport.