A statutory invention registration is not a patent. It has the defensive attributes of a patent but does not have the enforceable attributes of a patent. No article or advertisement or the like may use the term patent, or any term suggestive of a patent, when referring to a statutory invention registration. For more specific information on the rights associated with a statutory invention registration see 35 U.S.C. 157.
RADATION SHEILDING PELLETS

GOVERNMENT CONTRACT

This invention was made or conceived in the course of or under a contract with the U.S. Department of Energy.

BACKGROUND OF THE INVENTION

This invention relates in general to radiation shielding means, and more particularly to radiation shielding pellets containing at least two shielding materials within individual pellets.

Radiation shields often contain more than one type of material in order to provide attenuation over the entire spectrum of incident radiation. One common type of shielding application requires a gamma ray shielding metal such as tungsten or steel in combination with a hydrogen-rich neutron shielding material such as lithium hydride.

Since the radiation shield must provide uniform attenuation over a large surface area, the two required materials must be prevented from separating within the shield. This means that lithium hydride in a shield must be trapped in place. If it is allowed to liquify or form vapor bubbles, portions of the shield volume will come to have an incorrect ratio of LiH versus metal, and shielding will not be uniform.

Prior art shielding systems have dealt with this problem by attempting to maintain all portions of the shield below the melting point of LiH. The interior of the shield was filled with a honeycomb-like structure of tungsten or steel with LiH placed in the cells of the honeycomb. The metallic honeycomb conducted heat away from the LiH and to the outer surface of the shield.

However, honeycomb structures are difficult to fabricate, particularly if an active cooling means, such as a fluid flow heat removal system, is required. Moreover, honeycomb and cooling pipes required to maintain LiH in solid form tend to be heavy. This makes them undesirable for use in systems requiring active cooling which must be launched into space.

In addition, in shields wherein lithium hydride is cast and allowed to solidify, cracks often develop in the solid lithium hydride. These permit radiation to stream through.

OBJECTS OF THE INVENTION

Thus, it is one object of this invention to provide a radiation shield, incorporating more than one type of material, which is easy to fabricate.

It is another object to provide a pelletized radiation shielding material which can operate at elevated temperatures without failure, despite liquifaction or cracking of the hydrogen-rich neutron absorbing material.

It is a further object to provide a shield which is light weight and therefore particularly suitable for space applications.

SUMMARY OF THE INVENTION

These and other objects are obtained by forming shielding materials into pellets, wherein the exterior of each capsule is formed of a high melting point gamma ray shielding material, such as steel or tungsten, and the interior is formed of a lower melting point neutron shielding substance, such as lithium hydride.
Cooling fluid 420 enters container 400 via inlet port 430, picks up heat from shielding pellet bed 410, and exits via outlet port 431. Thus, heat is conveyed from the shield.

The foregoing is a description of a preferred embodiment of this invention. However, the invention need not be limited to particular types of shielding materials or pellet sizes.

What we claim is:

1. Radiation shielding pellets comprising:
   an outer shell of radiation shielding material having a first melting point; and
   an inner filling of radiation shielding material having a second melting point,
   wherein said first melting point is greater than said second melting point.

2. The pellets of claim 1 wherein said outer shell comprises a metal effective for shielding against gamma rays.

3. The pellets of claim 2 wherein said metal is selected from the group containing: iron, molybdenum, tungsten, depleted uranium, and alloys thereof.

4. The pellets of claim 1 wherein said inner filling comprises lithium hydride.

5. The pellets of claim 2 wherein said inner filling comprises lithium hydride and said outer shell is selected from the group containing tungsten, iron, molybdenum, depleted uranium, and alloys thereof.

6. A bed of radiation shielding pellets comprising pellets and retention means effective for maintaining a plurality of said pellets in position with respect to one another and also effective for containment of a cooling fluid in contact with said pellets,
   wherein said pellets comprise an outer shell of a first shielding material and an inner filling of a second shielding material; and
   wherein said retention means further comprises means for admission and exit of said cooling fluid.

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