to provide a selected crystal orientation in order to obtain the desired effects.

A preferred composition of the semiconductor includes about 5% by weight of tellurium, about 4% by weight of germanium, about 3% by weight of neodymium, and about 4.7% by weight of rubidium, with the balance of the composition being selenium. Such a composition can be made by melting these materials together or dissolving the materials in molten selenium.

Another highly advantageous composition has about 5% by weight of tellurium, about 4% by weight of germanium, about 3% by weight of neodymium, and about 2.24% by weight of gallium, with the balance being selenium. In order to make this composition, it is found desirable to add the very low melting gallium in the form of gallium selenide rather than an elemental gallium.

A third suitable composition has about 5% by weight of tellurium, about 4% by weight of neodymium, about 6% by weight of rubidium, with the balance being germanium. The preferred compositions set forth hereinabove are not absolute and it has been found that the level of dopant in the compositions can be varied within limits without significant loss of performance. Thus, it is found that the proportion of tellurium in the preferred composition can range from about 4.8 to about 5.5% by weight; the germanium can range from about 3.9% to 4.5%; neodymium can range from about 2.9 to 3.5% by weight; and rubidium can vary from about 4.5 to 5.0% by weight. The balance of the preferred composition is selenium, although it has also been found that nominal impurity levels can be tolerated and no great care is required in preventing minor contamination.

The other selenium base composition useful in practice of this invention can have a tellurium concentration in the range of from about 4.85 to 5.5% by weight; germanium in the range of from about 3.95 to 4.2% by weight; neodymium in the range of from about 2.85 to 3.2% by weight; and gallium in the range of from about 2.0 to 2.5% by weight. As in the preferred composition, the balance is selenium and nominal impurity levels can be tolerated. It is preferred to add the gallium in the form of gallium selenide rather than as elemental gallium with a corresponding decrease in the selenium used to make up the composition.

The above selenium base compositions are easier to make and less expensive than the germanium base composition and are therefore preferable for most applications. It is found that these are particularly suited for relatively small semiconductor tablets up to about 1 inch or a little less. For relatively large tablets, it is preferred to use the germanium base composition.

The germanium base composition has a tellurium level in the range of from about 4.75 to 5.5% by weight; neodymium in the range of from about 4.0 to 4.5% by weight; and rubidium in the range of from about 5.5 to 7.4% by weight. It is also found that it is of greater importance to maintain purity of the germanium base compositions than the selenium base compositions. Although the exact purity levels have not been ascertained, it is in excess of 99%.

It has been found that it is not necessary to have single crystals in the semiconductor tablets and any convenient grain size in excess of about 1 millimeter appears satisfactory. In the above compositions, when the recited ranges are exceeded, oscillation in the power pack drops off rapidly and may cease altogether.

The reasons that these compositions are satisfactory in the arrangement providing resonance amplification has not been determined with certainty. It is possible that the semiconductor serves as a source of electrons for providing an oscillating current in the circuit. This is, of course, combined with a relatively large area contact to one side of the semiconductor tablet, and a point contact on another area. Any resonant current in the coils wound on ferrite rod induces a varying magnetic field in the

resonant cavity, and the electrical connection between the ferrite rod and the metal probe provides a feedback of this oscillation to the semiconductor tablet.

It should particularly be noted that the oscillation in the circuit does not commence until it is initiated by an oscillating signal. In order to accomplish this, it is only necessary to apply a few millivolts AC for a few seconds to the semiconductor tablet and the associated coils coupled thereto. The initial signal applied to the base of the semiconductor tablet and the lead **39** is preferably in the frequency range of 5.8 to 18 mHz. and can be as high as 150 mHz. Such a signal can be applied from any conventional source and no great care appears necessary to provide a single frequency signal or eliminate noise. Once such energization has been given the circuit, and oscillations initiated, it does not appear to again be necessary to apply such a signal. This is apparently due to the feedback provided by the ferrite rod to the probe making point contact with the semiconductor.

Energy is, of course, dissipated in the lamp, or other utilization device, as the combination operates. Such energy may come from deterioration of the semiconductor tablet as oscillations continue; however, if there is such deterioration it is sufficiently slow that a power source may be operated for many months without attendance. Such a source of energy may be augmented by ambient RF radiation coupled into the resonant cavity by the external leads. This is a surprising phenomenon because the leads are small as compared to what would normally be considered an adequate antenna, and it is therefore postulated that stimulated amplification may also be a consequence of the unique electronic configuration of the semiconductors having the above-identified compositions.

Although only one embodiment of electric power pack constructed according to principles of this invention has been described and illustrated herein, many modifications and variations will be apparent to one skilled in the art. Thus, for example, a larger power pack may be axially arranged in a cylindrical container with various electronic elements arranged in the annular space therebetween. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

I claim:

1. A semiconductive composition selected from the group consisting of selenium including dopants consisting of tellurium in the range of from 4.8 to 5.5% by weight, germanium in the range of from about 3.9 to 4.5% by weight, neodymium in the range of from about 2.85 to 3.5% by weight, and either gallium in the range of from about 2.0 to 2.5% by weight or rubidium in the range of from about 4.5 to 5.0% by weight; and germanium including dopants consisting of tellurium in the range of from 4.75 to 5.5% by weight, neodymium in the range of from 4.0 to 4.5% by weight, and rubidium in the range of from about 5.5 to 7.0% by weight.

2. A semiconductive composition as defined in claim **1** comprising tellurium in the range of from 4.8 to 5.5% by weight, germanium in the range of from about 3.9 to 4.5% by weight, neodymium in the range of from about 2.9 to 3.5% by weight, rubidium in the range of from about 4.5 to 5.0% by weight with a balance of selenium.

3. A semiconductive composition as set forth in claim **2** having a composition of about 5% by weight of tellurium, about 4% by weight of germanium, about 3% by weight of neodymium, about 4.7% by weight of rubidium, and a balance of selenium.

4. A semiconductive composition as defined in claim **1** comprising tellurium in the range of from about 4.85 to 5.5% by weight, germanium in the range of from about 3.95 to 4.2% by weight, neodymium in the range of from about 2.85 to 3.2% by weight, gallium in the range of