STRAY LIGHT BAFFLE FOR A SEEKER OR OTHER SENSOR SYSTEM AND A METHOD FOR MAKING THE SAME

TECHNICAL FIELD

The present invention generally relates to a stray light baffle for a seeker or other sensor system and more particularly to a seeker including a stray light baffle having a coarse surface.

BACKGROUND

Missiles, rockets and other projectiles often use a seeker which gathers scene energy used for guidance and/or targeting purposes. A seeker is part of the guidance system and is typically mounted on the top or in the front of the missile or other projectile. In combination with refractive elements, a seeker typically uses a series of mirrors, lenses, and filters to focus, split and direct radio frequency signals, infrared signals, visible signals and/or other types of signals to respective receivers and often has a dome to protect the equipment. The radio frequency signals, infrared signals and visible signals may be used, for example, for imaging and targeting. The signals used by the seeker are first transmitted through the dome before being split and directed to their respective receivers by the mirrors, lenses, and filters. The missile, rocket or other projectile may have a processor to interpret the received radio frequency signal and infrared signal signals to track a target and to guide the projectile to the target.

The receivers (or sensors) designed to receive the scene signals may be protected from stray out-of-field signals by stray light (energy) baffles, which are designed to prevent unwanted energy to interfere with the desired scene energy. Typical stray light baffles are machined aluminum or some other material which is subsequently painted black to absorb stray and infrared light energy. However, the paint is often labor intensive to apply and has a tendency to flake or chip off which can then land on sensors and cause interference or undesirable light scattering. Further, after the paint has flaked or chipped off, the exposed aluminum or other material is less effective at absorbing undesirable signals or light. Alternately, a metal baffle is anodized or has a surface treatment for absorption of stray light signals. Such surface treatments, however, are much less effective than paint at absorbing stray light signals especially at large incidence angles.

Accordingly, it is desirable to have an improved stray light baffle which is not subject to the problems of current stray light baffles. Other desirable features and characteristics will become apparent from the subsequent detailed description and the appended claims, taken in conjunction with the accompanying drawings and this background.

BRIEF SUMMARY

In one exemplary embodiment a seeker is provided. The seeker may include a first receiver configured to receive an infrared signal, a second receiver configured to receive a radio frequency signal, a dichroic mirror configured to reflect the infrared signal toward the first receiver and to transmit the radio frequency signal toward the second receiver, and a stray light baffle having a coarse surface comprising a plurality of peaks and a plurality of valleys, wherein an average height of the plurality of peaks is greater than or equal to an average width of the plurality of valleys.

In another exemplary embodiment a sensor system is provided. The sensor system includes, but is not limited to, a first

receiver configured to receive a ray bundle, and a stray light baffle having substantially coarse walls and configured to protect the first receiver from undesirable ray bundles.

In another exemplary embodiment, a method for building a stray light baffle, is provided. The method may include, but is not limited to, determining a shape of the stray light baffle, determining at least one material for building the stray light baffle, determining an orientation to build the stray light baffle, and building the stray light baffle using a selective laser sintering process based upon the determined shape, the at least one determined material and the determined orientation.

BRIEF DESCRIPTION OF THE DRAWINGS

The embodiments will hereinafter be described in conjunction with the following figures.

FIG. **1** illustrates a cross-sectional view of an exemplary seeker in accordance with an embodiment;

FIG. **2** illustrates is a close up, cross-sectional view of a wall **200** of a stray light baffle in accordance with an embodiment;

FIG. **3** illustrates a side view of an exemplary stray light baffle in accordance with an embodiment;

FIG. **4** is a perspective view of the stray light baffle illustrated in FIG. **3** in accordance with an embodiment;

FIG. **5** illustrates a side view of another exemplary stray light baffle in accordance with an embodiment;

FIG. **6** is a perspective view of the stray light baffle illustrated in FIG. **5** in accordance with an embodiment;

FIG. **7** is a flow chart illustrating a method for building a stray light baffle in accordance with an embodiment;

FIG. **8** is a perspective view of another exemplary cylindrical stray light baffle in accordance with an embodiment; and

FIG. **9** is a side view of another exemplary conically frustum stray light baffle in accordance with an embodiment.

DETAILED DESCRIPTION OF THE DRAWINGS

The following detailed description is merely exemplary in nature and is not intended to limit the embodiments or the application and uses of the embodiments. Furthermore, there is no intention to be bound by any theory presented in the preceding background or the following detailed description of the drawings.

FIG. **1** illustrates a cross-sectional view of an exemplary seeker **100**. The seeker **100** illustrated in FIG. **1** is a multi-mode seeker, capable of receiving several different types of signals. For example, seeker **100** could include a millimeter-wave ("MMW") transceiver **110**, an infrared ("IR") receiver **120**, a primary mirror **130** and a dichroic mirror **140**. The primary mirror **130** is configured to reflect and focus a ray bundle, for example ray bundle **160**, including a two-way MMW radiated pattern, which is a type of radio frequency (RF) signal, and a received IR signal to the dichroic mirror **140** and may be substantially parabolic in shape. The shape and composition of the primary mirror can be selected to accurately reflect the MMW signal and the IR signal received by the seeker to the dichroic mirror **140**. The dichroic mirror **140** can be configured to reflect IR signals to the IR receiver **120** and is further configured to transmit (i.e., allow to pass) the MMW signal to the MMW transceiver **110**. The composition and shape of the dichroic mirror **140** can be selected to focus and transmit the MMW signal to the MMW transceiver **110** while reflecting and focusing the IR signal to the IR receiver **120**.