Low Cost Zinc Sulfide Missile Dome Manufacturing

*Develop and demonstrate advanced manufacturing methods and processes that will provide a capability to produce affordable multi-mode windows and domes for the new generation of sensors for missiles, munitions, and surveillance systems.*

**OBJECTIVE / SOLUTION**

The existing material choice for long wave-infrared (LWIR) and semi-active laser domes is multispectral zinc sulfide (ZnS), but current manufacturing processes are expensive and time consuming, resulting in major cost and lead time issues for missile systems that employ LWIR seekers. Variability of the current chemical vapor deposition (CVD) process limits repeatability of grown material.

Current processes [CVD and hot isostatic pressing (HIP)] are time-consuming, and yields are low. The objective of this effort is to develop and demonstrate manufacturing processes that are optimized for the production of durable, multi-spectral ZnS domes at a substantially lower cost and shorter lead time than currently available.

**ACHIEVEMENTS**

Forecasted achievements are:

― Improved control of ZnS process parameters
― Improved zinc (Zn) flows
― Increased uniformity (ZnS thickness profile)
― Increased deposition rate
― Minimized size and concentration of inclusions and fibers in the ZnS domes due to improved dust exhaust management
― Improved yields by obtaining a more uniform deposition profile
― Minimized cracking by employing better tooling design
― Increased number of dome sites through better management of the Zn source
― Reduced cycle times for all processes.

**BENEFITS**

- Reduces dome cost by 62%
- Increases yields by 36%
- Increases strength by 43%
- Promotes competition among ZnS producers

**STATUS**

- Initial trades complete and on schedule
- Project transitioned to Non-Line-of-Sight Launch System (NLOS-LS) in FY09
- Project transitions to Joint Air-to-Ground Missile (JAGM) in FY11

**WEAPON SYSTEMS / SECONDARY ITEMS IMPACTED**

- Joint Air-to-Ground Missile (JAGM)
- Small Diameter Bomb II—Air Force
- Military systems employing ZnS windows and sensors

**POTENTIAL COST AVOIDANCE**

- Return on Investment of 19.4 to 1 with a cost benefit of $156M

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