Granular Pyrophoric Infrared Signature Material
Randall Thompson
Introduction

• Infrared imaging technology has been widely adopted in many defense applications.
• Some IR technologies are passive.
• Others require an active source of infrared radiation to be applied to the object of interest.
• Today, Esterline will discuss an infrared radiation emitting material for just that purpose.
Material Description

• This material will be granular in form, porous, and dark grey in color.
• Grain size ranging from 75 to 250 microns.
• The material itself is activated pyrophoric metal.
• Initiated by contact with an oxidizer, most likely atmospheric oxygen upon deployment.
• Material must be isolated from all oxidizers until activation.
• This isolation will be accomplished by material packaging.
Material Description

- Activation to be accomplished by deliberately failing the material’s packaging.
- Ambient oxygen initiates the emission of infrared radiation.
- The material reaction temperature and the duration of reaction can be controlled.
- Not affected by temperature extremes or thermal shock.
Material Description

• The emission of radiation in the visible spectrum is also available if desired.
• Signatures can range from infrared only (covert), to combined visual and infrared.
• In covert form, it can be seen only by NVGs or Thermal Targeting systems.
• In combined form, it also provides an unambiguous visual indication that can be seen at great distances.
Material Performance
Material Performance
Material Performance
How the material is made

- Mix the metals together.
- Perform the intermetallic reaction.
- Crush and grind the material.
- Chemically remove one of the metals.
- Dry
- Classify particle size: dispersion, temperature, duration.
- Finalize desired output signature if necessary.
- Load, assemble, and pack the material.
How the material is made
Applications

• Possible uses for this material include:
  – Night time target practice ammunition impact marking.
  – Covert target marking.
  – Covert distress signaling.
  – Other marking or signaling applications.
  – ???
Applications

• When used as a night time target practice ammunition payload, the material
  – Is environmentally benign, “green” ammo.
  – Does not require a fuze.
  – Produces no “dud” rounds that cause expensive cleanup and delays associated with traditional energetic material payloads.
  – Can be seen at distances in excess of 1,000 meters.
  – Is a safe and cost competitive alternative to existing technologies, and is available for testing today.
Summary

• Esterline has developed a new material that offers many advantages over current payloads.
  – Environmentally friendly
  – Flexible and cost effective
  – Good tactical simulation characteristics
  – It can be used in a wide variety of applications from training to search and rescue.

• Esterline looks forward to applying this payload in a number of ammunition applications.
Questions?

Mr. Randall Thompson
Program Manager
Esterline Defense Technologies
85901 Avenue 53
Coachella, CA 92236
(760) 398-0143 x 1416
randall.thompson@esterline.com
www.esterline.com