

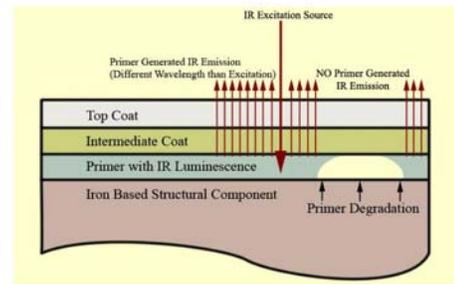
**Non-Confidential Description - PSU No. 3371**  
**“Smart Coatings/Coating Systems for Detection of Flaws, Damage, Erosion, Corrosion, and Defects”**

**Keywords:**

Coatings, Sensing, Detection, Structural Materials, Nondestructive evaluation

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**Illustration of Smart Coating System**

**Background**

Corrosion is the leading cause of material and structural failure causing over \$100 billion worth of damage annually in the United States. The largest market segment for corrosion prevention is that of protective organic and metallic coatings applied to ferric components. Defects and damage to the protective coating act as initiation sites for subsurface degradation. Methods for the early detection of such damage are limited and costly resulting in the need for a coating that allows for rapid inspection and early detection of coating flaws and damage to surface and subsurface coatings.

**Invention Description**

This invention describes a coating system that permits non-destructive evaluation and detection of surface and subsurface regions of a protective coating after application to a material. The coating system includes a layer or region with one or more interactive or “smart” materials adapted to provide an optical emission response when stimulated with appropriate electromagnetic energy. The stimulates can be incorporated in the surface or subsurface layers of the protective coating to allow for rapid inspection and detection of flaws or damage in the coating.

**Advantages/Applications**

- Allows for early and rapid detection of flaws
- Relies on optical observation with greatly enhanced optical response compared to traditional visual inspection
- Reveals flaws and damage that cannot be easily detected by traditional visual inspection
- Allows for “tailored” coating systems for specific applications
- Coatings can be applied to a wide variety of materials