CLAIMS:

1. A sulfidation corrosion mitigation coating (14), comprising:

a sulfidation corrosion mitigation material, wherein the sulfidation corrosion mitigation material comprises cerium oxide;

a binder, wherein the binder comprises an aluminum phosphate;

a wetting agent; and

a plurality of indicator oxide nanoparticles (18), wherein the indicator oxide nanoparticles comprise europium oxide;

wherein the coating (14) comprises a first indicator layer (16) having an increased concentration of indicator oxide nanoparticles as compared to the rest of the coating.

2. The coating (14) of claim 1, wherein the cerium oxide comprises a dopant selected from Gd, Y, La, Sm, Ca, Mg, Ba, Sr, Sc, Pr, Yb, Nd, Ho, Dy, Er, and any combination thereof.

3. The coating (14) of any preceding claim, wherein the sulfidation corrosion mitigation material comprises a noble metal decorated cerium oxide.

4. The coating (14) of claim 3, wherein the noble metal comprises Pt, Pd, or a combination thereof.

5. The coating (14) of any preceding claim, wherein the sulfidation corrosion mitigation material comprises a combination of cerium oxide and a noble metal decorated cerium oxide.

6. The coating (14) of any preceding claim, wherein the indicator layer (16) is comprised of indicator oxide nanoparticles (18) capable of emitting a different fluorescence from the binder or the wetting agent.

7. The coating (14) of any preceding claim, comprising a second indicator layer (16b) having an increased concentration of indicator oxide particles (18) compared to the first indicator layer (16).

8. The coating (14) of claim 7, wherein the first indicator layer (16) is comprised of indicator oxide nanoparticles that are different from the indicator oxide nanoparticles of the second indicator layer (16b).

9. The coating (14) of any preceding claim, wherein the coating (14) has a thickness of from 1 μm to 30 μm.

10. An article (10) comprising:

a metal alloy substrate (12) having a surface; and

a sulfidation corrosion mitigation coating (14) of any preceding claim on the surface.

11. A method for inspection of an article having a surface with a sulfidation corrosion mitigation coating thereon, the method comprising:

exposing the surface of the article having the sulfidation corrosion mitigation coating thereon to an environment having a sulfur corrosive material; and

utilizing one or more light emitting devices to inspect the article to identify corrosion, oxidation, worn areas of the coating, or mechanically damaged areas of the coating, wherein the sulfidation corrosion mitigation coating comprises the coating of any of claims 1-9.