Contribution ID: **144** Type: **Wedge Participant**

Tamper-Indicating Enclosures with Visually Obvious Tamper Response

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We are developing "bleeding"materials (analog of visually obvious bruised skin that doesn't heal) that provide inspectors the ability to readily recognize using simple visual observation that penetration into a material used as a tamper-indicating enclosure has been attempted without providing adversaries the ability to repair damage. Such material can significantly enhance the current capability for tamper-indicating enclosures (TIEs), used to support treaty verification regimes. Current approaches rely on time-consuming and subjective visual assessment by an inspector, external equipment such as eddy current or cameras, or active approaches that may be limited due to application environment. The complexity of securing whole volumes includes (1) enclosures that are non-standard in size/shape, (2) enclosures that may be inspectorate or facility owned, (3) tamper attempts that are detectable and not difficult or timely for an inspector to locate, (4) solutions that are robust regarding reliability and environment (including facility handling), and (5) solutions that prevent adversaries from repairing penetrations. Our approach is based on a sensor compound within a microcapsule that changes color irreversibly when the microcapsule is ruptured. We are investigating 3D printing of the microcapsules as well as a spray coating formulation.

The anticipated benefits of this work are passive, flexible, scalable, cost-effective TIEs with obvious and robust responses to tamper attempts. This results in more efficient and effective monitoring as inspectors will require little or no additional equipment, and will be able to detect tamper without extensive time-consuming visual examination. Note that if desired, an autonomous system with a spectrometer could also detect the color change. Applications can include custom TIEs (cabinets or equipment enclosures), spray-coating onto facility-owned items, spray-coating of walls or structures, spray-coatings of circuit boards, and 3D printed seal bodies.

Which "Key Question" does your Abstract address?

TEC2.1

Which alternative "Key Question" does your Abstract address? (if any)

TEC2.2

Topics

TEC2

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