



Degradable Taggant for Improved Change Detection over Time

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TITLE
Degradable Taggant
and Method of Mak-
ing and Using
Thereof

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SUMMARY

- The taggant is composed of one or more fluorophores (such as a laser dye) and a substrate (such as titanium dioxide or silicone dioxide); both very stable materials.
- Degradable over time when exposed to light through the process of photobleaching.
- In powder form and is spread, sprayed, or dusted over the desired area.
- Any activity in tagged area (such as digging, humans walking, etc.) results in a change in the taggant's aerial distribution.
- Change detection using image analysis, ratio-metric fluorescence spectroscopy, fast temporal measurements or a combination of these methods for high sensitivity and rejection of false positives.
- Allows identification of individuals who walked in tagged area, since they pick up taggants on shoes and clothes (ie. for evidence of IED placement.)

BACKGROUND

Improvised explosive devices (IEDs or "roadside bombs") are the major cause of combat casualties. Hand triggered IEDs are laid at all hours of the day, and can be detonated by various triggering mechanisms. Currently, the most effective way to detect an IED is through visual change detection of the local environment. However, it must be sensitive to subtle changes in a noisy background, while minimizing false positive and negative results. As additional nondegradable taggant is dispersed, the ground is contaminated, leaving the signal to noise ratio (SNR) nearly impossible to detect.

The current invention overcomes these limitations with a low-cost, easily deployed, degradable taggant that is dispersed over a wide area to serve as a witness to area activity. The taggant enables nearly real-time change detection of the area using one or more optical sensing techniques.

ADVANTAGES

- Completely passive, both in generating a return signal and in method of degradation.
- Nearly undetectable by the unaided eye.
- Is applied using low cost, conventional spraying equipment.
- Can be suspended in liquid to minimize unwanted dispersion by wind.
- Can be created with a variety of absorption/emission wavelengths.
- By mixing several taggant "colors" together, replication is nearly impossible.
- Two detection modes of SNR adds additional security.
- An odorizer can be used to allow canine detection.
- Selection of dyes and sensing techniques can eliminate sunblinding, allowing change detection to occur in day or night.