



# Luminescent Additives for Brand and Liability Protection, and Process Control

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## Opportunities:

- Innovative traceability system for supply chains
- Unbeaten anti-counterfeiting, anti-diversion solution
- Enhanced and automated process and quality control
- Limiting liability and warranty claims
- Direct product marking inseparable from its host
- Machine readability: instant, non-destructive, repeatable, in-field

# Anti-microbial coatings



# Seed coatings



# Tracer paints



# Architectural coatings



# Conformal coatings



# Tracer comparison

Tracers / Authentication	Level	Security	Availability	Robustness	Cost per Unit	Cost of Authentication
Bar and QR codes / Readers	Overt	Low	Common	Low	Low	Low
Holograms	Overt/Covert	Low	Common	Medium	Medium	None
RFID / Readers	Overt	Low	Common	Medium	Medium	Low
DNA tracers / Detection devices	Covert	High	Common-rare	Low	Medium	High
Isotope tracers / Mass-spectrometry	Forensic	High	Unique	High	High	High
Inscribed plastic micro platelets / Lens	Covert	Medium	Common	Medium	Medium	Low
Magnetic micro-fibers/ Detection devices	Covert	High	Common-rare	Medium	High	Medium
Organic luminescent tracers / Detection devices	Covert/Forensic	High	Common-rare	Low	Low	Medium
Inorganic luminescent tracers / Detection devices	Overt/Covert/Forensic	High	Rare-unique	High	Low	Low

**Unique, High Security and Robustness, Low Cost per Unit and Authentication**

## How the technology works

### 1. Inorganic, optical tracers

- Proprietary
- Largest portfolio

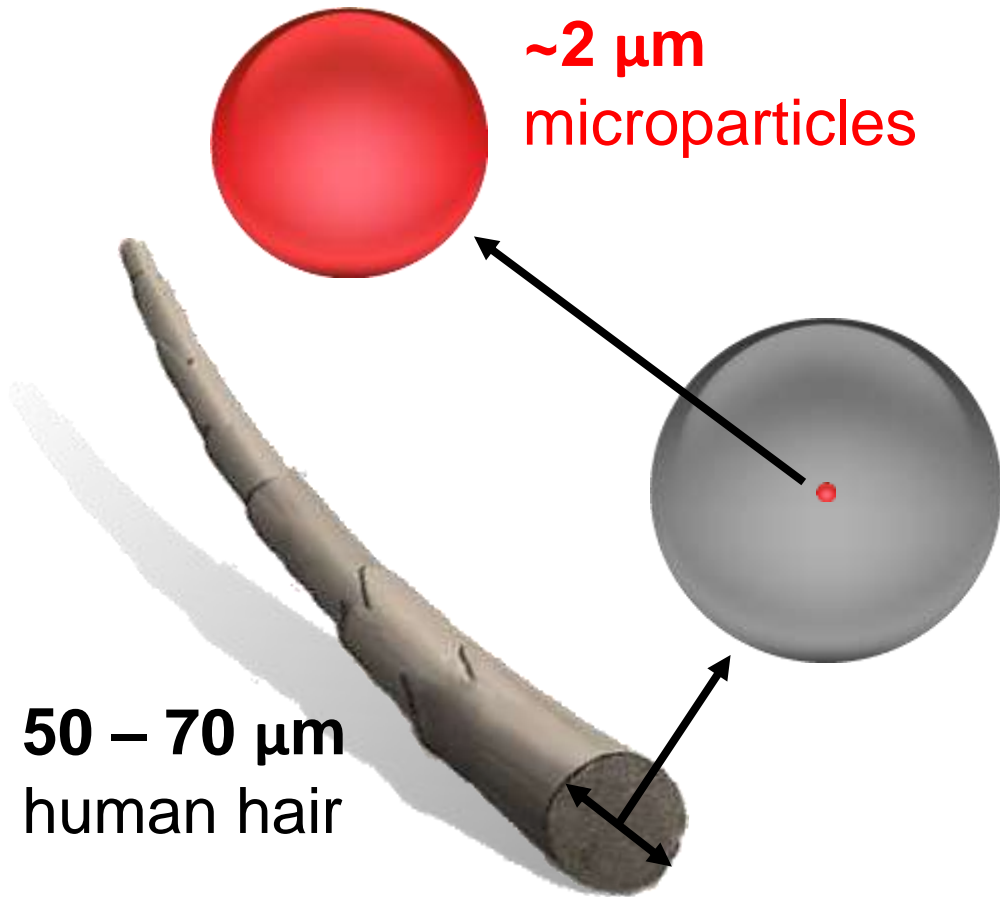


### 2. Detection devices

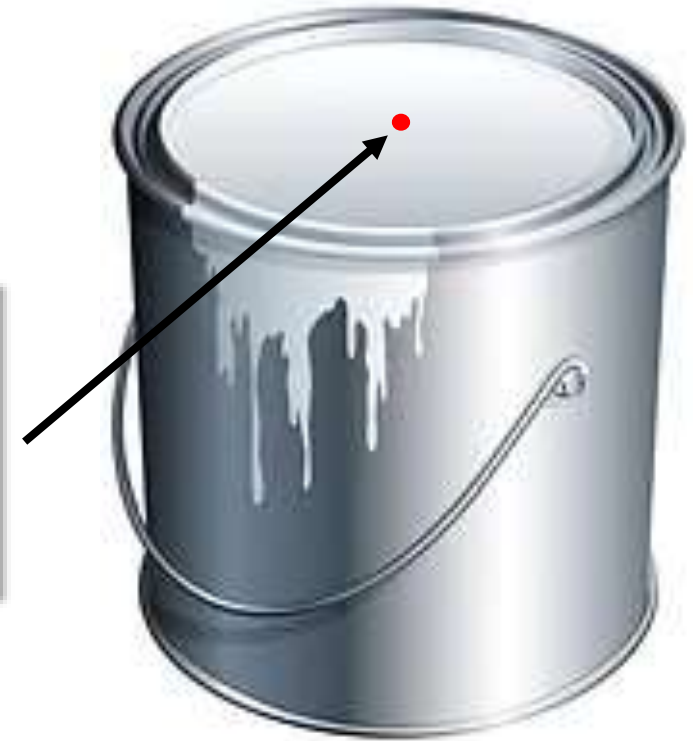
- Instant authentication
- Non-destructive test
- Multiple tracer capability
- Custom built to application



# Luminescent Additives



~ 1 gram of  
additive to mark  
1 gallon of paint



## Physical characteristics

- Unaffected by harsh environments:  
*Direct sunlight & Ultra-Violet (UV) light, humidity, freezing, saltwater, solvents & aggressive chemicals, or high temperatures.*
- Efficiency does not diminish over lifetime of product
- Inorganic, extremely robust, with the lifetime of diamonds
- Easily incorporated into thousands of applications:  
*Viscose (shown in photo), Upcycled Ocean Plastic<sup>®</sup> and any other polymer, paint, adhesives, epoxy, ink... the sky's the limit.*



## Physical characteristics (*cont.*)

- Dielectric/non-static, non-flammable, non-conductive, transparent/invisible in thin film coating application
- Safe & environmentally friendly:  
*Non-toxic, no heavy metals, inert, approved for: food contact, medical devices, and toys.*



- Heavy, can settle out, agitation required, potential dispersant required for certain applications.

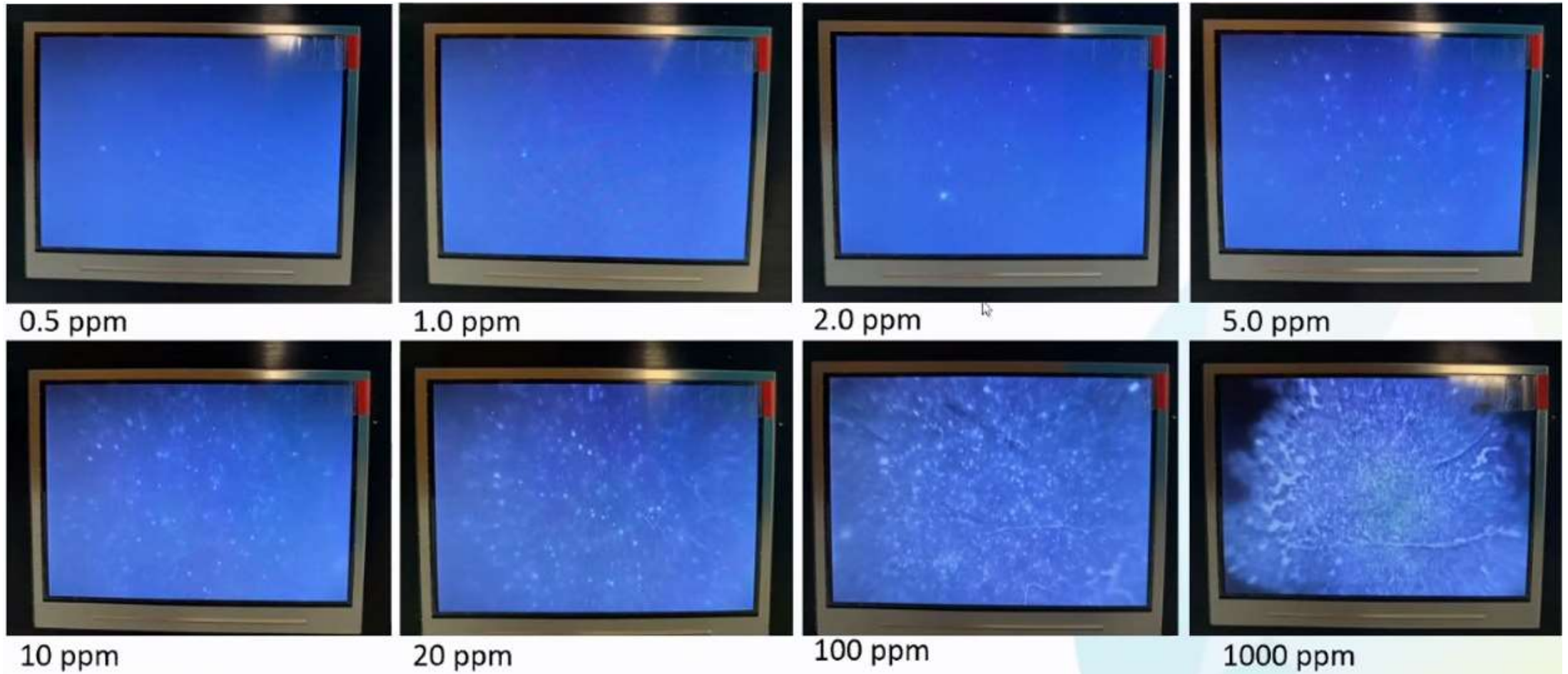


## Integration of luminescent additives

- Chemically inert in aqueous, solvent, and UV
- Directly mixed into powder, liquid or other media
- Dispersed via masterbatch in polymers
- High-shear mixing
- Chemical dispersants are available



# Luminescent Additives Visualized



# InfraRed latent print visualization

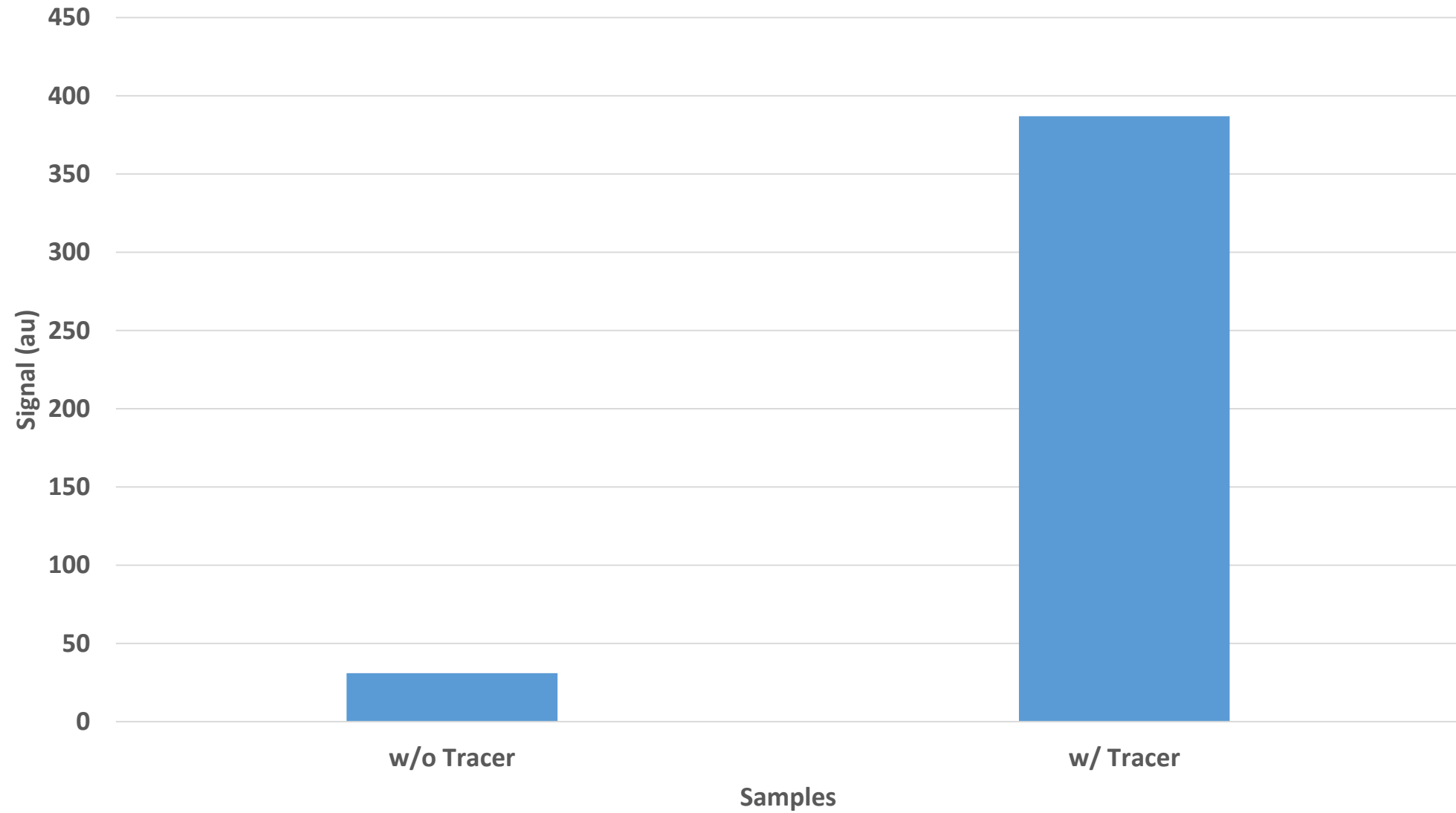


## Detection of luminescent additives in coatings

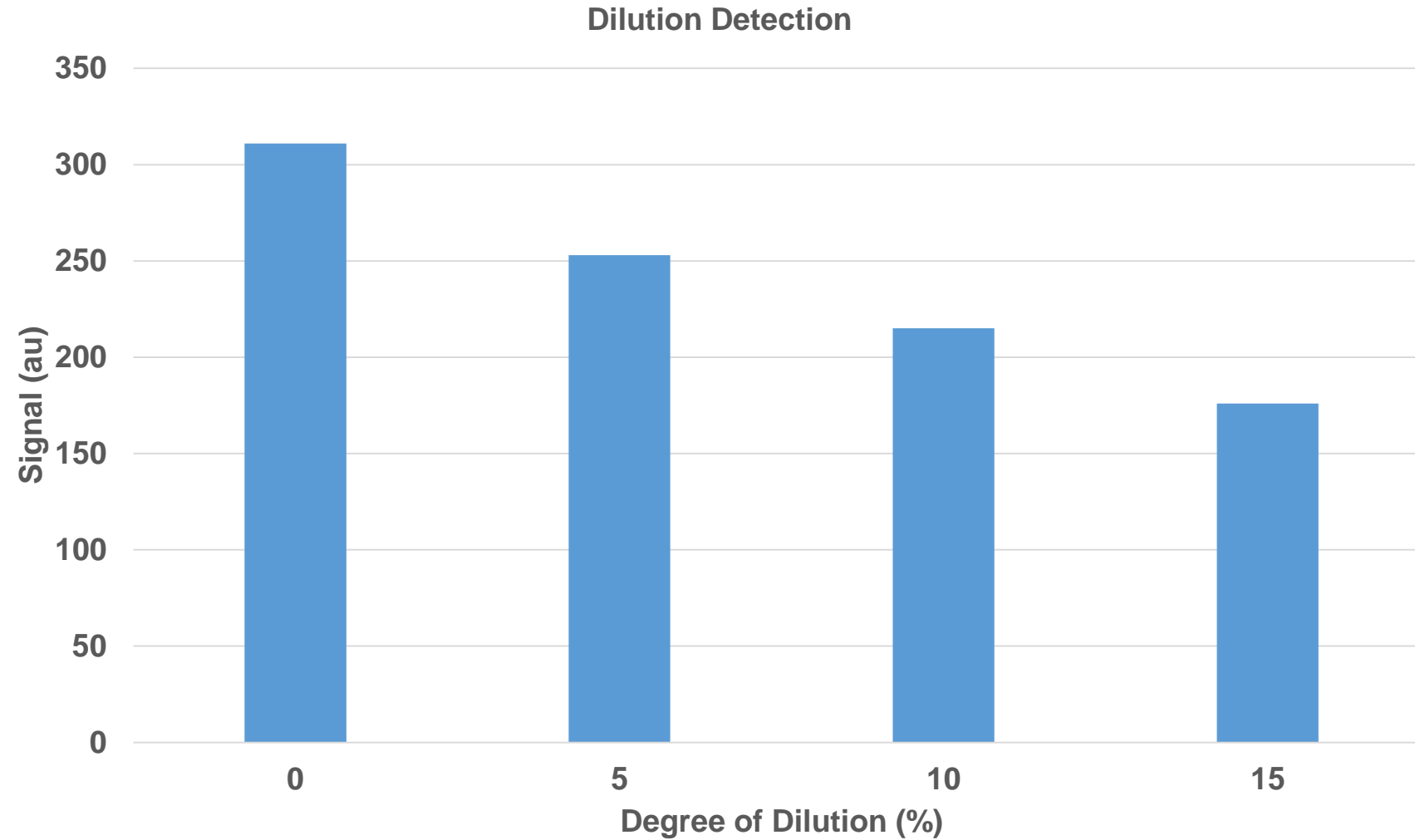
- Hand-held, field-ready detection device
- Immediate, unambiguous results
- Non-destructive testing
- NO laboratory testing required
  - *NO added wait or cost for results*
- Ease of use
- Multi-marker differentiation
- Audio, visual, and/or vibration feedback result



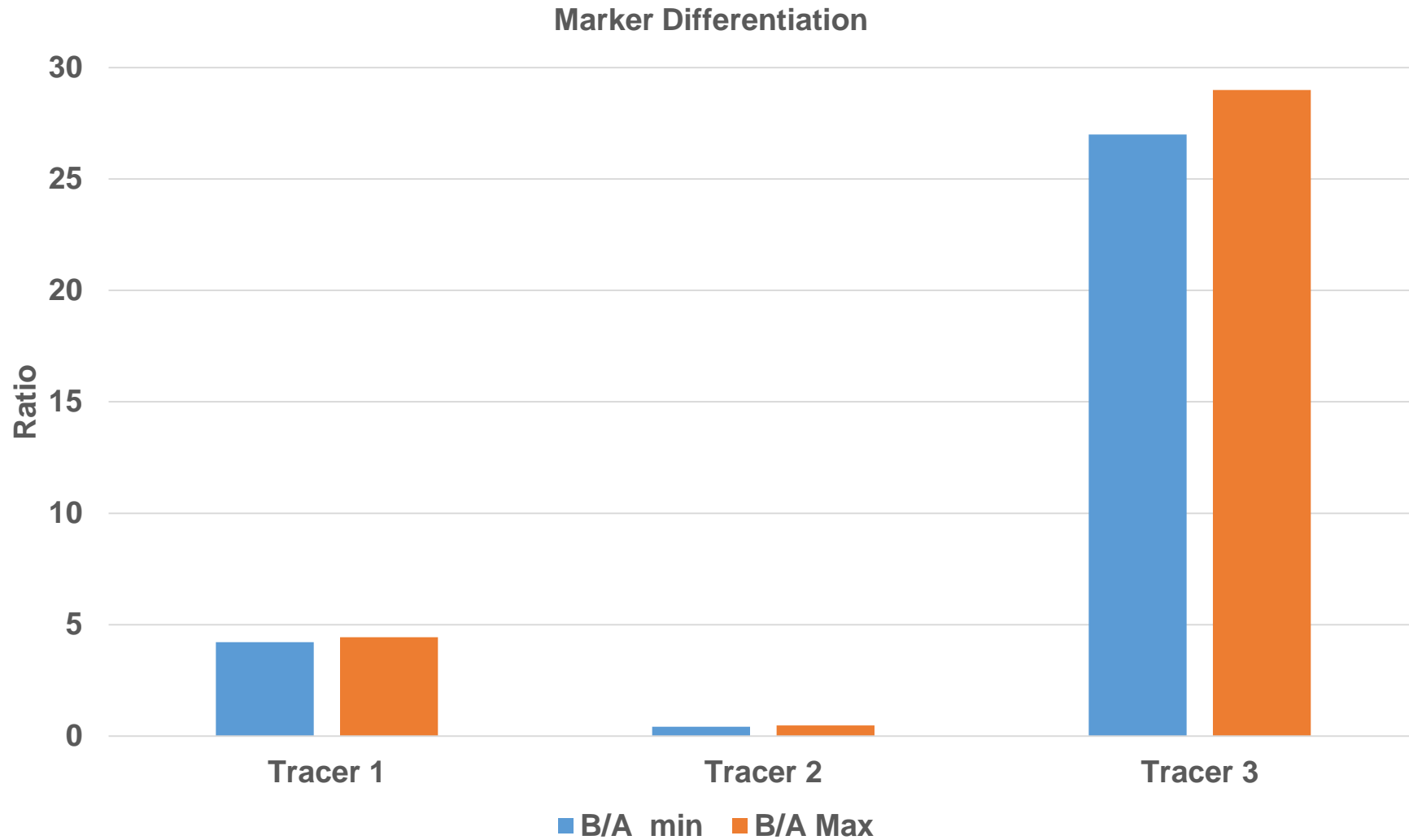
### Detection of Marked Primer or Basecoat

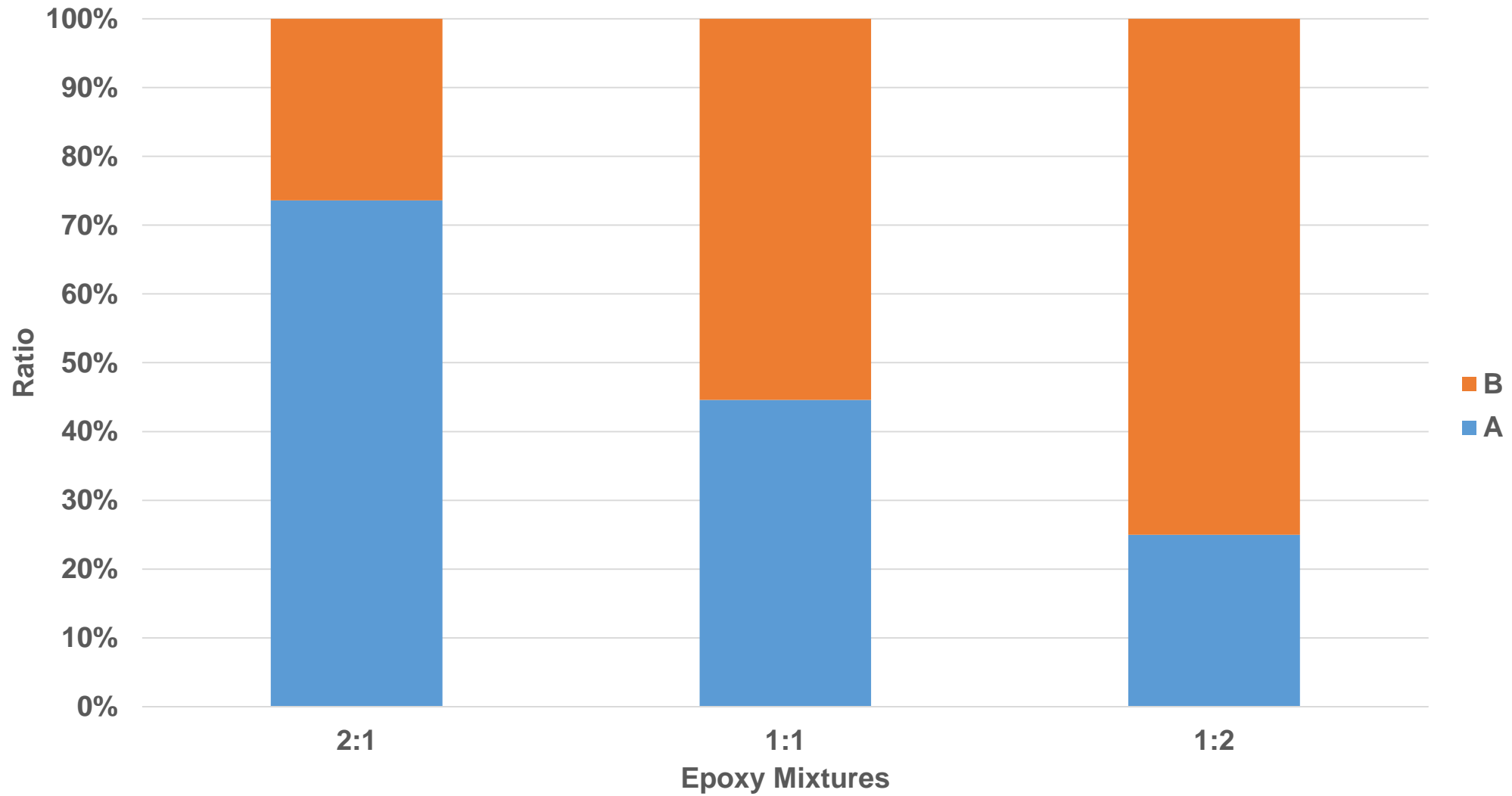


# Application: Dilution detection



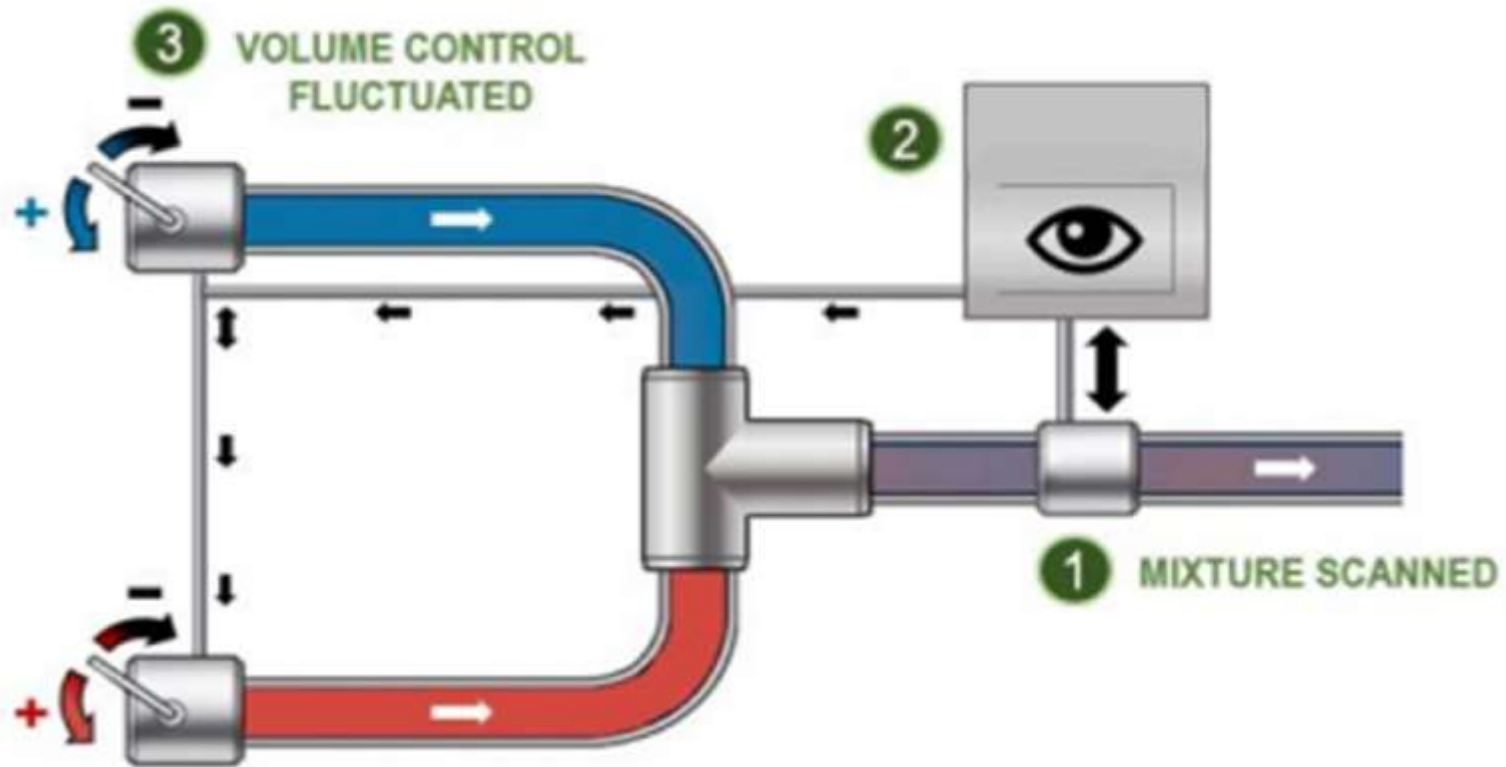
# Application: Covert differentiation





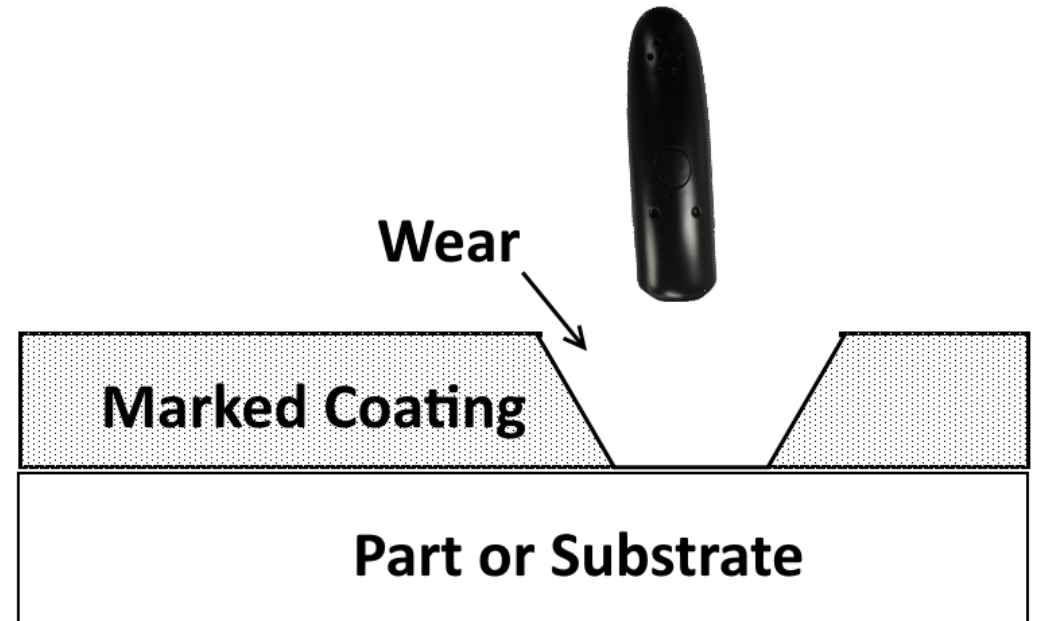


# Process control



## **Application:** Wear detection and thickness uniformity

- No need for subjective color assessment
- Quantifiable thickness evaluation
- Pointed or averaged location measurement
- Sensor-automated monitoring



## Luminescent additives

- Enable brands to make demonstrative claims for brand protection
- Physically link products and raw materials to Certification Documents
- Simplify identification:
  - Machine-readable, instant, reliable, repeatable, non-destructive, in-field results
  - *NO lab testing required!*
- Nearly limitless applications



## Luminescent Additives (*cont.*)

- Offer court-admissible evidence for: liability, warranty, brand protection, and contract enforcement
- Remain with the product/coating for its lifetime
- Easily integrated:
  - *NO additional processing steps*
  - *NO costly infrastructure*
- Establish Direct Supply Chain Traceability



# Questions?

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