

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

September 2021

## Opportunities:

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

# 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

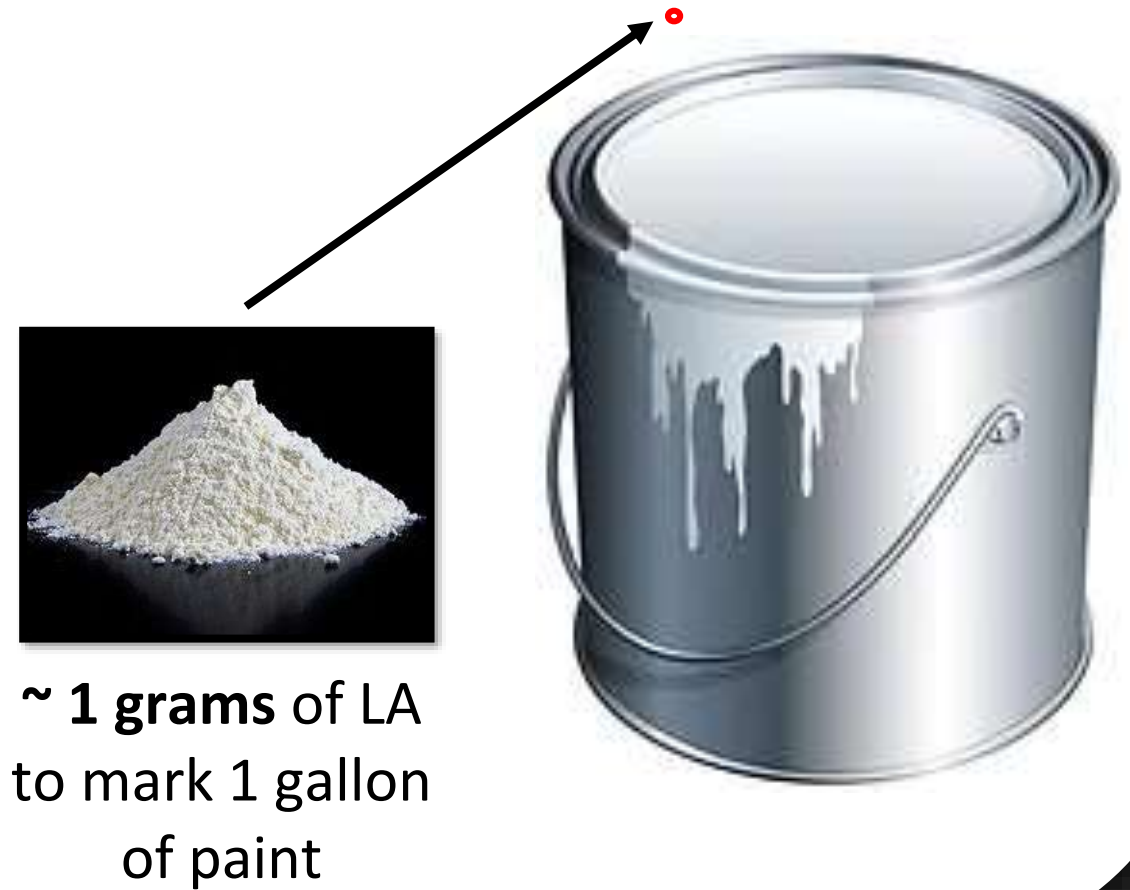
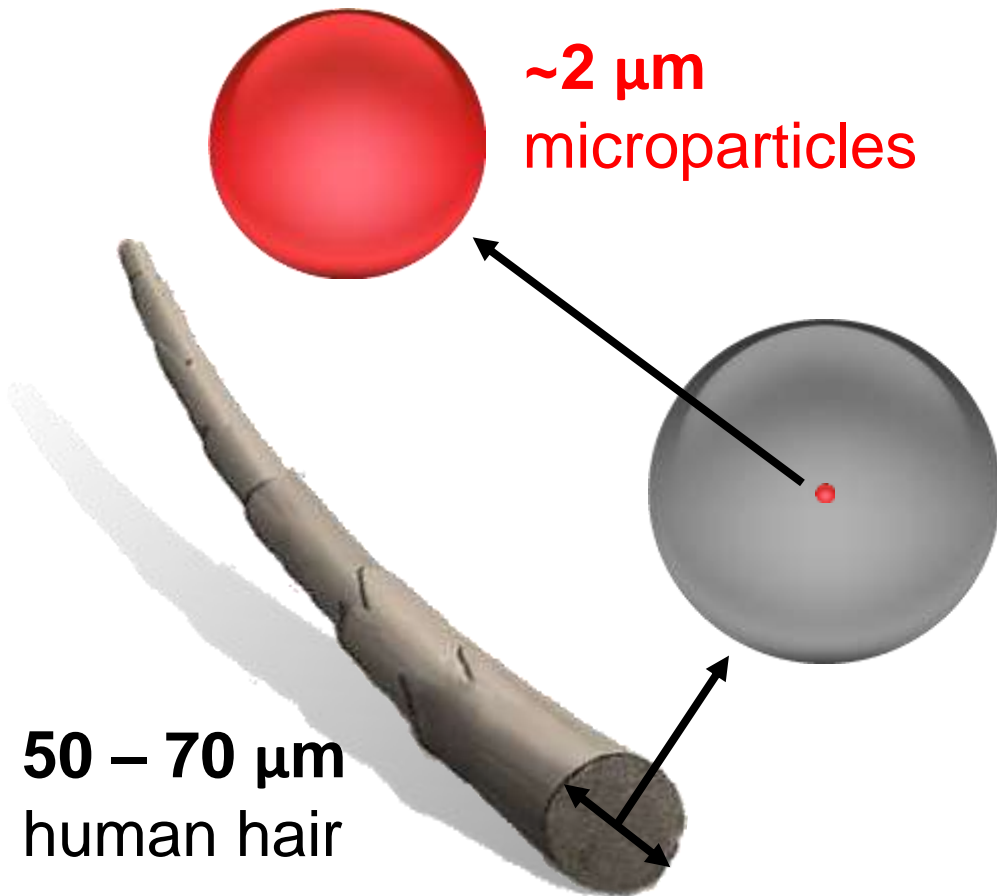
- Instant authentication
- Non-destructive
- Universal
- Custom-built



**Technology: Two-Part System**



# Luminescent Additives (LA)



**Technology: Tracers**

# 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® and any other polymer, paint, adhesives, epoxy, ink... the sky's the limit.*



**Technology: Tracers**

## 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.

**Technology: Tracers**

# Integration of luminescent additives

- Directly mixed into powder, liquid or other media
- Dispersed via masterbatch in most polymers
- High-shear mixing is recommended
- Chemical dispersant is sometimes required





# Luminescent Additives visualized



0.5 ppm



1.0 ppm



2.0 ppm



5.0 ppm



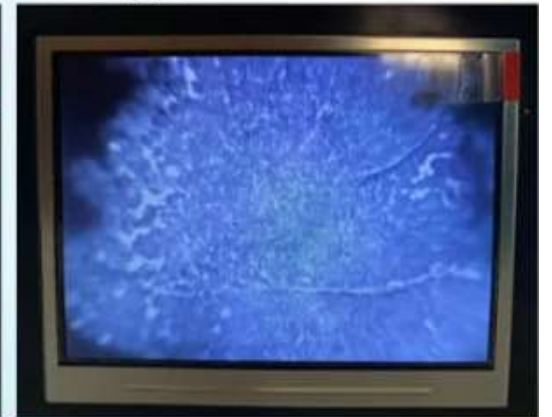
10 ppm



20 ppm



100 ppm



1000 ppm

**Technology: Tracers**

# Detecting 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



**Technology: Detection Devices**

# InfraRed latent print visualization



Technology: Detection Devices



# Anti-microbial coatings



# Seed coatings



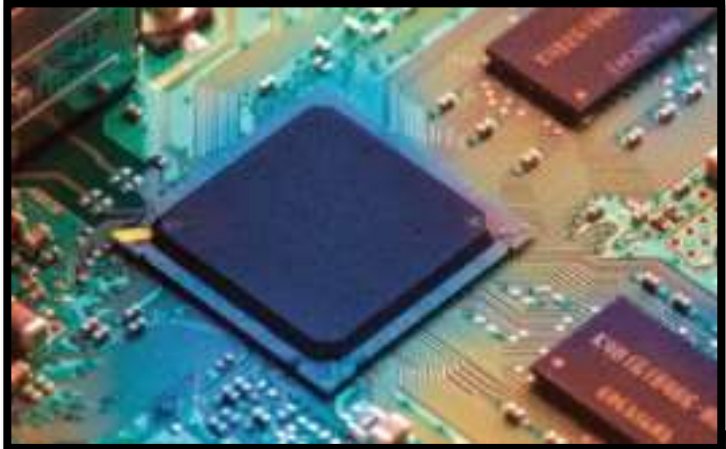
# Tracer paints



# Architectural coatings



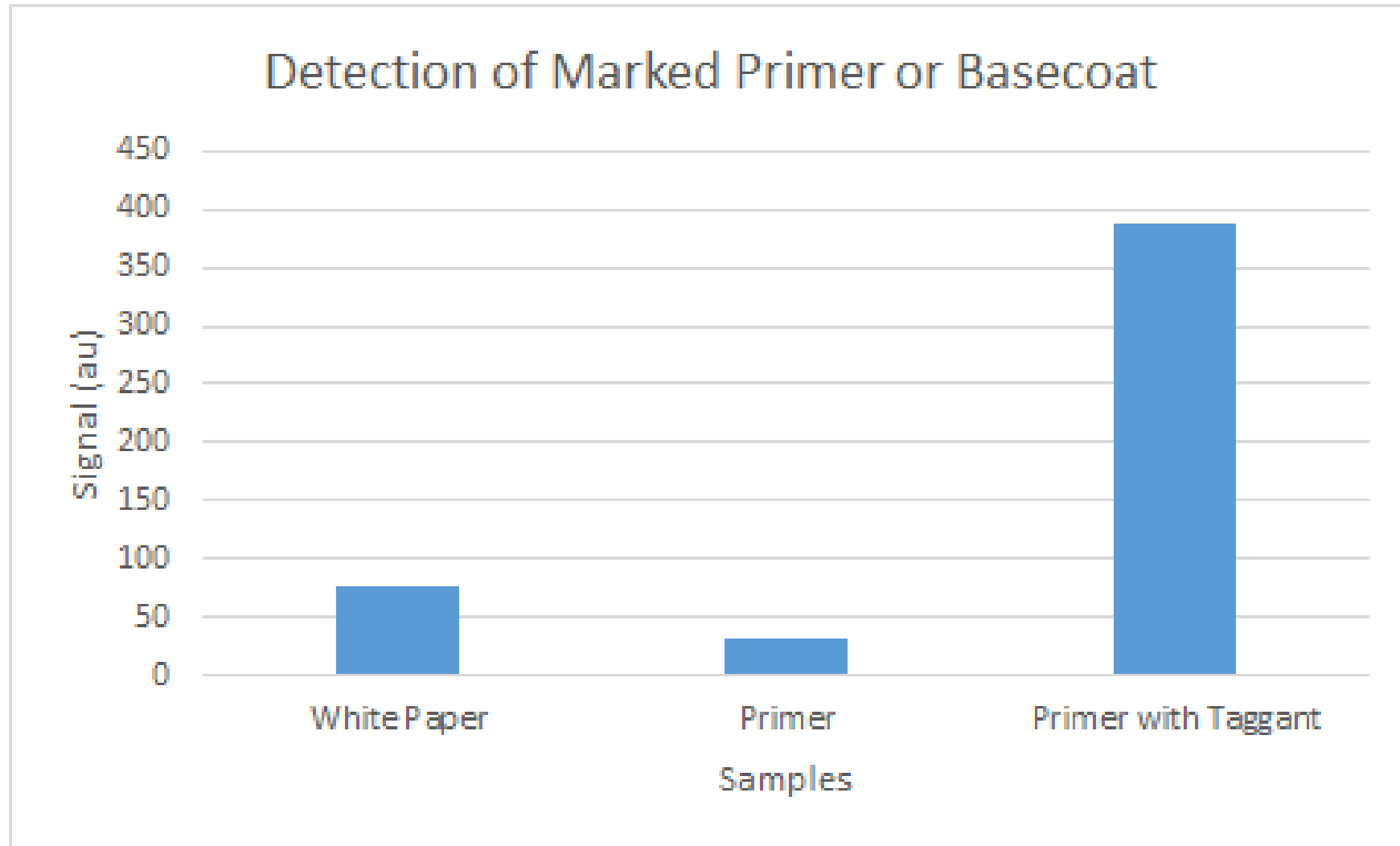
# Conformal coatings



# Applications

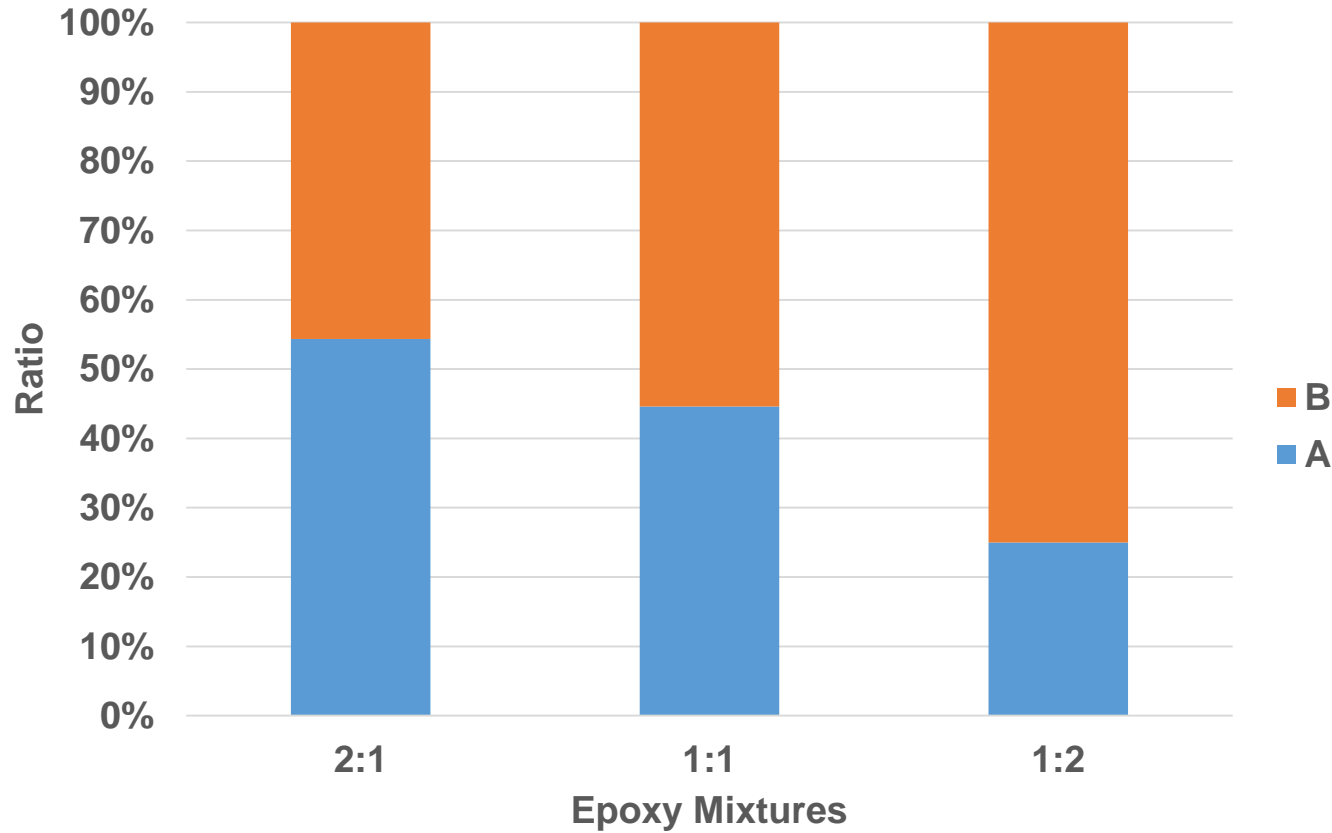


# Application: Detecting marked layers below top and final coatings



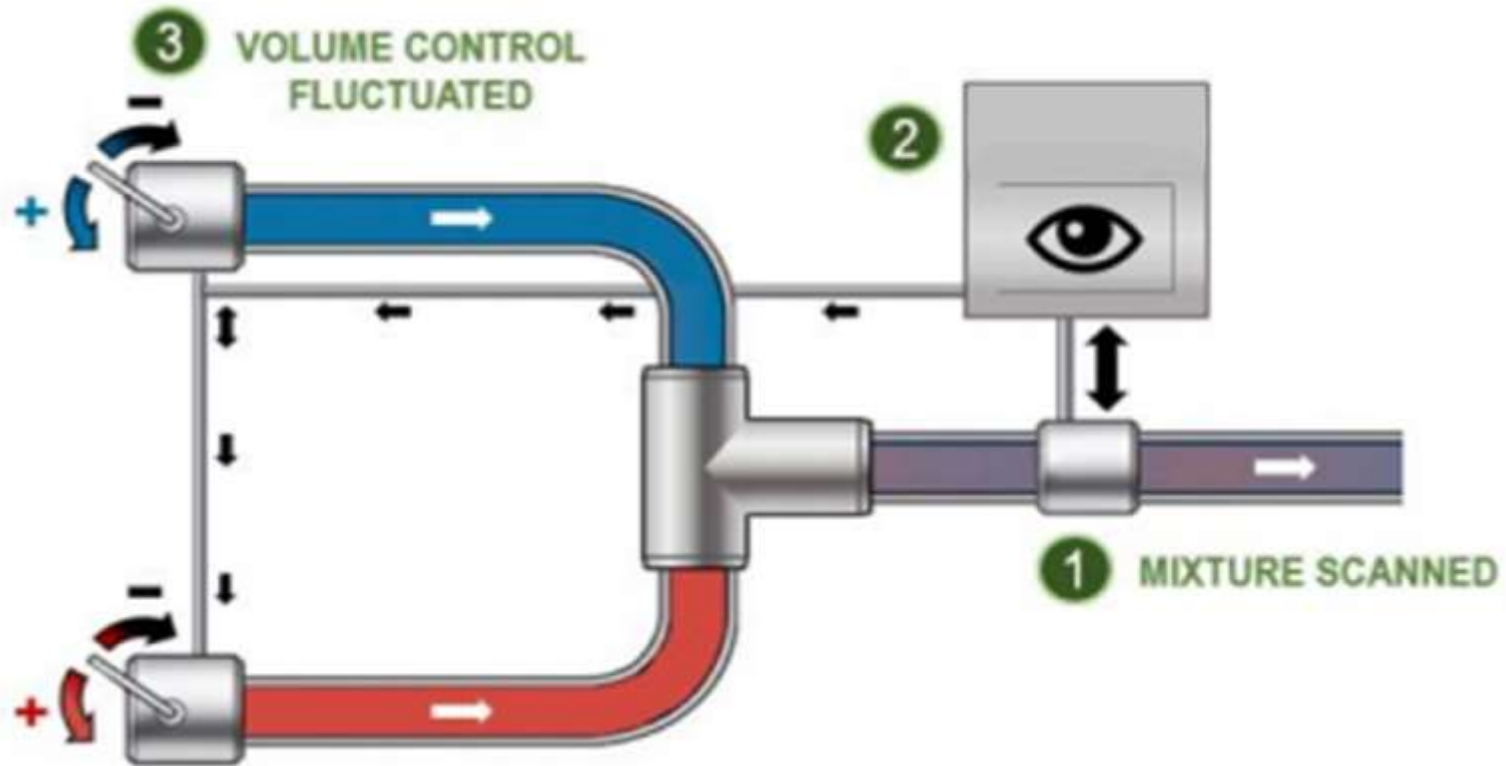
Application

# Application: Multiple component mixture (e.g. epoxy)



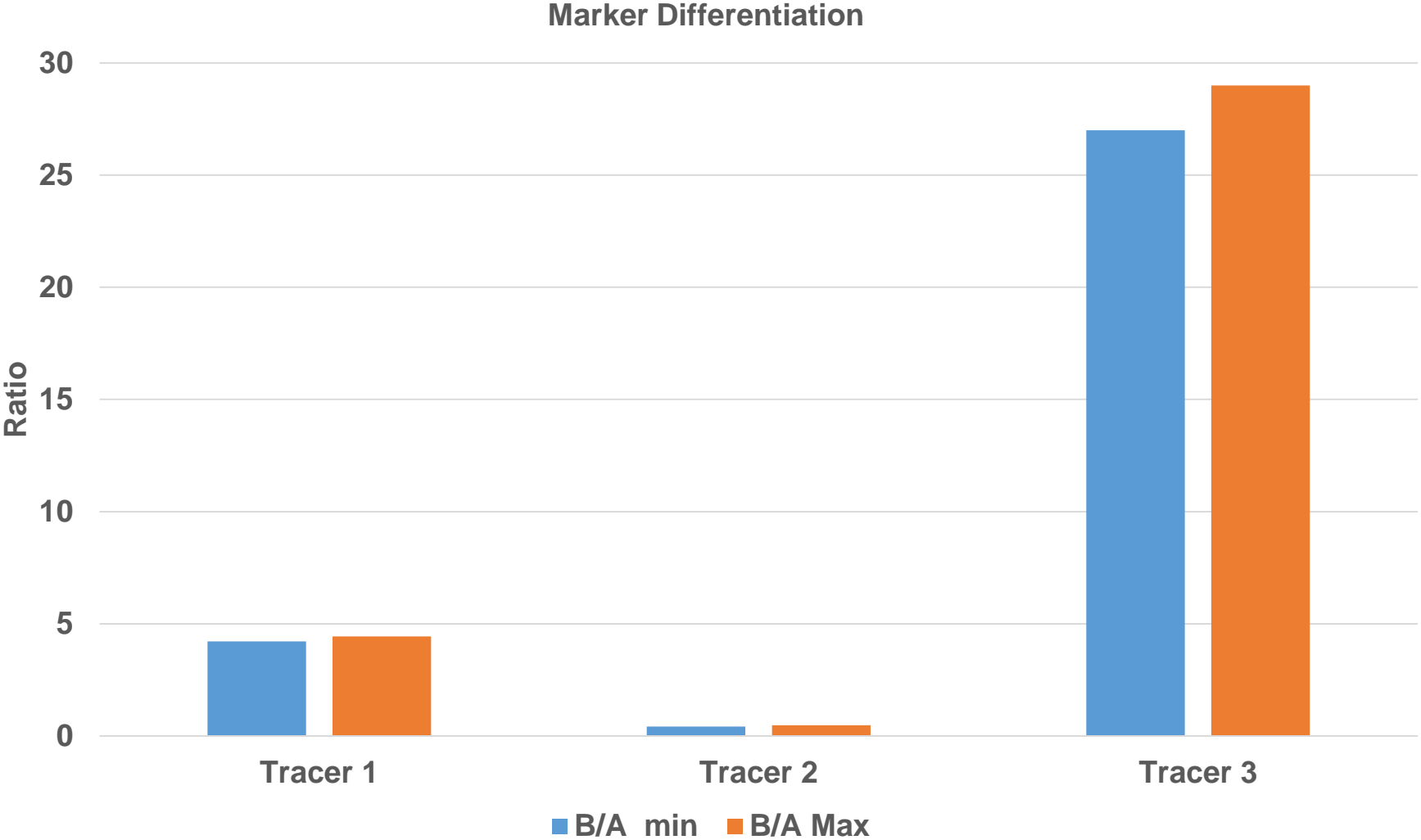
Application

# Process control



Application

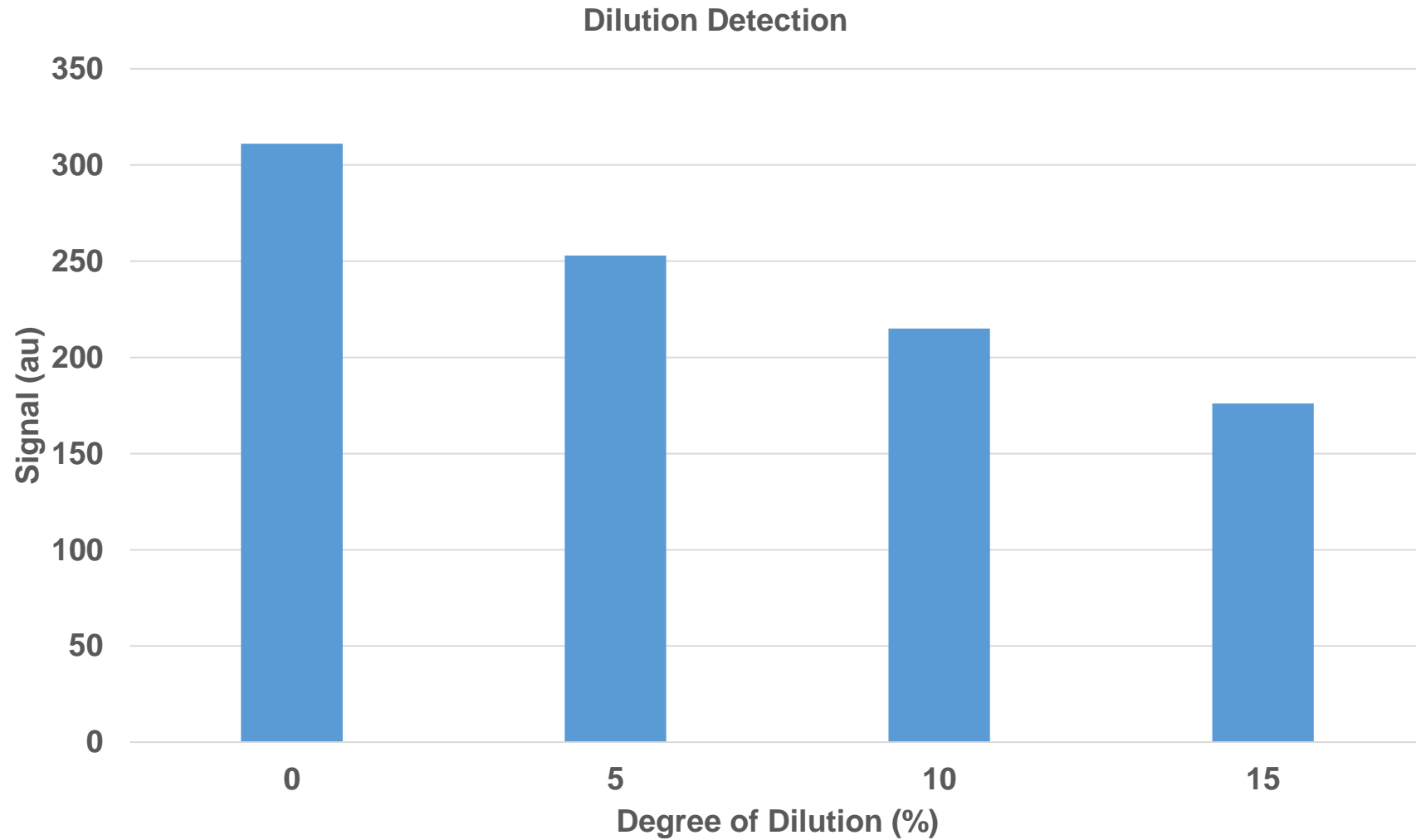
# Application: Covert (invisible) differentiation



Application



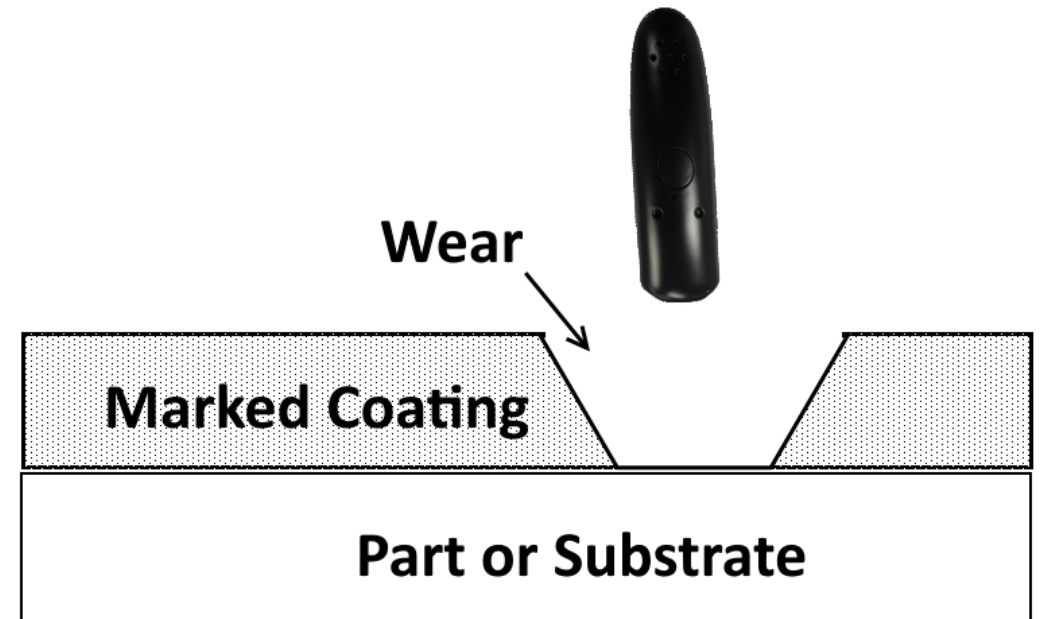
# Application: Dilution detection



Application

## **Application:** Dilution detection (*e.g. wear and uniformity*)

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



**Application**

# Advantages of luminescent additives

- Brand protection: Enables brands to make demonstrative claims
- Physically links products and raw materials with certification documents
- Simplifies identification:
  - Machine readable, instant, reliable, repeatable, non-destructive, in-field results
  - *NO lab testing required!*
- Nearly limitless applications



## Advantages of luminescent additives (*cont'*)

- Offers court-admissible evidence for: Liability, warranty, brand protection, and contract enforcement
- Remains with the product/coating for its lifetime
- Easily integrated:
  - *NO additional processing steps*
  - *NO costly infrastructure*
- Establishes direct supply chain traceability





A night landscape featuring a starry sky with a prominent galaxy (the Milky Way) arching across the upper half. Below the sky, there are snow-capped mountains and a valley with a small pond. The overall scene is illuminated with a blue and purple color palette.

# Questions?

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