



“Can’t we just use a UV lamp?”

At the beginning of many projects, customers ask a simple question: “Can’t we just use a UV lamp?” The idea is intuitive: switch on the light, see a glow, confirm authenticity. But modern material and product security demand more. Materials have become more complex, supply chains more global, and counterfeiting more sophisticated. Visual effects alone are no longer proof of identity.

This article explains why classical UV fluorescence provides only a qualitative signal, why simple detectors and smartphone-based approaches reach physical limits, and how spectroscopic material authentication opens a new level of security moving from visual inspection to verified identity embedded inside the material itself.

With the Tailor-Scan 4.1 platform, Tailorlux brings laboratory-grade spectroscopy into robust, connected industrial handheld devices transforming material authentication into a secure, digital verification event ready for traceability systems and Digital Product Passports.



Why material security needs more than visual fluorescence

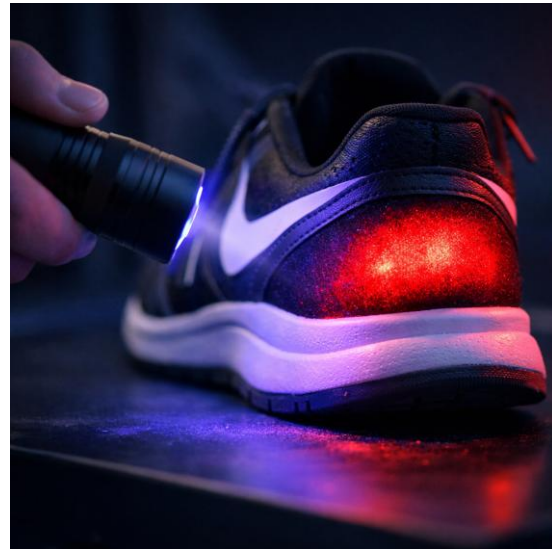
When discussing security markers, one question appears in almost every conversation:

“Can’t we simply use a UV lamp?”

The question is understandable. For decades, ultraviolet fluorescence has been used to reveal security features in banknotes, documents and branded products.

A lamp, a visible glow, a quick check.

But modern material security has moved far beyond visual inspection.





Visual fluorescence: a qualitative signal

Classical UV-based features rely on fluorescent materials that emit visible light under ultraviolet excitation. The user observes a color impression and confirms authenticity.

However, visual observation has fundamental limits.

The human eye cannot distinguish precise emission wavelengths.
Substrate color, surface texture and ambient light influence perception.
Two different fluorescent materials may appear identical to an observer.



A visible glow provides a qualitative impression not a unique spectral identity.



If it is easy to see, it is easy to imitate

Fluorescent pigments and UV excitation sources are widely available. Colors, excitation wavelengths and application methods are publicly known.

This makes it possible to reproduce similar visual effects with off-the-shelf materials. A feature that relies only on visible appearance offers limited resistance to replication.

Visual fluorescence remains useful, but it is no longer sufficient for robust material authentication.

Security markers are also subject to cost pressure: while visible UV fluorescence requires relatively high marker concentrations, a high-performance detection device can reliably identify markers at trace levels making simple UV-lamp-based solutions economically less efficient in total system cost.

Small electronic UV detectors: an intermediate step

To improve selectivity, compact electronic UV detectors were introduced. They identify fluorescence beyond human perception and trigger a detection signal.

These devices are helpful for quick screening, but they remain limited:

- broadband signal detection
- sensitivity to substrate color and absorption
- limited ability to distinguish different markers
- risk of false-positive readings in complex materials

For modern industrial substrates colored polymers, coated surfaces, multi-layer textiles such detection principles reach their limits.



What about smartphones and AI?

Another logical question follows:

“We already carry powerful smartphones can’t they do the job?”

Smartphones equipped with cameras, illumination sources and AI algorithms are indeed powerful tools. They already contribute to recognizing visual security features, analyzing print patterns or reading surface-based identifiers. Some brands have even considered implementing NIR spectrometers into their smartphones too for examples check the sugar levels of fruits.

In many applications, smartphones are highly effective.

However, Tailorlux focuses on a different challenge:

Authenticating the material itself. Detecting material heritage when now label or identifier has been attached yet or has already been removed by a rough lifecycle or damage of a product.

Material authenticity introduces stricter technical requirements:

- Markers embedded inside the material, not on the surface
- Non-uniform, rough or scattering substrates
- No smooth optical surface for imaging
- Extremely low marker concentrations
- No visible or printed identifier available

In these environments, surface-based methods such as printing, engraving, QR codes, RFID or NFC can fail over time. Labels detach, surfaces wear, coatings scratch, tags are removed.

Material-integrated markers remain present, but they require spectroscopic detection rather than imaging.

Smartphone optics and illumination are optimized for imaging surfaces. They are not designed to excite and detect trace-level spectroscopic marker signatures inside complex bulk materials.

This is not a limitation of smartphones it is simply a different physical task. However, they do play a crucial role in the next generation of our Tailor-Scan 4.1 device.



Detecting identity inside complex materials

Material authentication therefore requires:

- controlled excitation sources
- high-resolution spectral detection
- stable optoelectronics
- calibration and reference management
- reliable discrimination without false negatives
- field-ready, easy-to-use hardware

In essence, a laboratory measurement principle engineered into an industrial handheld device.

This is the foundation of the Tailor-Scan platform.

Why connectivity is part of security

Authenticity today is not only optical it is digital.

Detection devices must:

- authenticate themselves
- receive encrypted reference data
- apply user permissions
- log verification events
- integrate into traceability and Digital Product Passport systems

WiFi and Bluetooth are therefore not accessories they are part of a secure system architecture that ensures trusted results across global supply chains.



From visual inspection to verified material identity

Visual security features remain valuable.

Smartphones and AI already contribute significantly to security and inspection tasks.

But when authenticity must be proven at the **material level**, inside complex industrial substrates, stricter requirements apply.

Dedicated spectroscopic detection transforms a material check into a verified identity event ready for audit, traceability and digital product passports.

A UV lamp reveals a glow.

A camera recognizes a pattern.

A spectroscopic system verifies material identity.

Each tool has its place.

For material authenticity, dedicated detection is essential.

If you are exploring material authentication or traceability, we are happy to exchange ideas.

With the new **Tailor-Scan 4.1 series**, Tailorlux addresses all of these requirements in a single platform.

Tailor-Scan 4.1 brings high-resolution spectroscopy out of the laboratory and into real industrial environments. It is designed to operate as a connected device, transforming material authentication from a manual inspection step into a **digital, verifiable event log**.

The system combines:

- High-resolution VIS and NIR spectroscopy in a handheld device
- Multiple excitation wavelengths covering the full Tailorlux marker portfolio
- Robust field-ready hardware designed for non-experts
- Simple guided user interaction without spectroscopy knowledge
- Secure reference and permission management
- Encrypted device connectivity via WiFi and Bluetooth

Tailor-Scan can connect to smartphones or backend systems, allowing every authentication event to be enriched with contextual metadata time, location, batch, operator or supply-chain process step.



At the same time, its security architecture protects marker information. Only authorized users receive access to specific marker references. In this way, the system operates as a **true key-and-lock principle**: the marker embedded in the material is the lock the Tailor-Scan device, with its secured digital reference, is the key.

The result is not just detection but **verified material identity**, ready for traceability platforms, Digital Product Passports and secure supply-chain infrastructures.

Interested in exploring material authentication for your products or supply chain? Let's exchange ideas — reach out to us at info@tailorlux.com.