

Taggants

Easy to use and highly effective

by Stephen Pinchen

The need for a robust and sophisticated form of covert document identification has never been more apparent. Counterfeiters are always alert to conventional security methods, and in many cases they've passed off convincing forgeries. In turn, this is driving the development of proprietary technologies that are nigh-on impossible to replicate. Taggants have proven a highly effective solution, and the latest generation of taggants is exceptionally versatile and secure, enabling convenient and effective authentication.

Forgery-related crime, whether perpetrated by an individual who forges a passport or a counterfeiter who passes off consumer goods bearing fake tax stamps, presents governments with a growing problem. One that emphasizes the importance of accurate, reliable and secure means of authentication. Unless this threat is thwarted, public safety, tax revenues and the integrity of the state are all at risk. While government-issued documents generate an enormous amount of trust, trust isn't enough. Advances in technology provide criminals with the means to produce realistic replicas that convince the untrained eye, requiring governments to use more discerning methods of authentication. It's a case of staying one step ahead of the counterfeiting community by introducing secure means of differentiating between genuine and fake documents. In other words, documents that are almost impossible to forge.

Security devices are, of course, commonplace, and many current technologies are able to authenticate documents or products. Think, for example, of holograms, OVIs and security printing techniques such as guilloche patterns and fine line designs, all of which offer the end-user some reassurance about the document's authenticity. These highly visual techniques offer a welcome first-line defence and provide instant verification. Having said that, government agencies and security professionals recognise that covert methods provide essential back-

up. Covert methods are methods that can only be detected by 'those in the know'. As a consequence, they not only provide a secure means of authentication, they also present counterfeiters with a more formidable challenge.

The solution - taggants

For a covert authentication technique to be effective, it's imperative that counterfeiters are unable to detect its presence simply by guessing. For example, the use of UV inks is comparatively easy to detect (even though the replication of print designs and the sourcing of UV security pigments is far more complicated). The security industry has responded by developing multi-layer technologies, and it is here that taggants have started to play a role in document authentication. A taggant is a chemical marker, typically manufactured using complex rare-earth phosphor compounds that are difficult to source. When engineered at molecular level, these compounds emit a unique signature under certain conditions. For many taggants, the trigger is excitation by infra-red radiation. Others may only be visible under a microscope - a sort of 'nano-barcode'. Due to their size, taggants can easily be included in inks, lacquers, or even plastics (master batch). Some will work regardless of environmental conditions or product background colour, making them easy to integrate into government documents such as passports and tax stamps. They can also be embedded in packaging materials, such as cartons, overwrap, labels and tapes, allowing brands and products to be protected.

Different taggant technologies

While taggants are a widely recognised authentication technology, the absence of a 'one-size-fits-all' model significantly enhances their effectiveness as a security device. The specific composition and structure of each taggant make it almost impossible to replicate (without having prior knowledge of the molecular structure). Sophisticated counterfeiters are well aware of the extent to which taggants can thwart the creation of convincing forgeries. Admittedly, highly standardised taggants have been compromised due to their availability - some can even be sourced online, which rather defeats the object! The success of a taggant therefore hinges on control over supply. The most reputable taggant manufacturers will keep tight control of their chemical combinations, preventing third parties from acquiring the taggant.



Stephen Pinchen has 25 years of product and business development experience, gained within the consumer packaging and security industries. Since 1992 he has developed several groundbreaking brand protection and track & trace technologies. He has also been involved in a number of global security roll-out programmes for leading manufacturers of tobacco, alcohol and pharmaceuticals. He holds directorships at several Filtrona plc companies within the Coated & Security Products Division, including Payne Security and FractureCode Corporation.

Another important element that distinguishes different taggant technologies is the type of reader used, and the technology it deploys to identify and authenticate the taggant. Invariably, the more exclusive and proprietary the device, the harder it is to source or copy. This also raises the effectiveness of the solution. While it is particularly important that the link between the reader and the taggant is not discovered, other factors also play a role. These include the speed of verification, the user-friendliness of the reading equipment, the ability to read multiple signatures and, of course, the cost of the overall solution.

Next generation taggants

Technology companies are now developing patented taggant authentication systems that use proprietary reading technology to authenticate products and documents without which potential counterfeiters cannot locate the position and appearance of the taggant. For example, some taggant readers use a detection method to analyse a specific property of the taggant pigment (the frequency and natural decay signature that enables them to identify the specific taggant). This ensures the reader can be programmed to recognise and authenticate a number of different documents or products. It also enables the detection of other commercially available phosphor taggant materials. This feature can be used to show the presence of other taggant materials (used in other products or in the production of pass-off or unauthorised products). The reader provides a clear description of the taggant it detects, and can be programmed to store multiple taggant signatures. A simple traffic light system is used: genuine taggants are given a green light, while alternative taggants will trigger an orange light.

Unlike historically available taggants, the latest systems often do not rely on the visible fluorescence of taggant particles, and is therefore unaffected by background colour or ambient lighting conditions. This optimises system versatility, allowing it to be deployed in different markets and for different applications. Readers themselves are user-friendly, lightweight, handheld and pocket-sized, and therefore ideally suited to deployment 'in the field' by company personnel, customs officials or authorised agents. It uses no complex optics or software, and is both inexpensive and easy to master.

Application

Taggants have been developed for use in a variety of markets. As far as document authentication is concerned, they may be included in passports, visas, ID cards, tax stamps and banknotes. Taggants can also be used to protect consumer goods, particularly high-end goods that are prone to counterfeiting, such as alcohol, tobacco and pharmaceuticals.

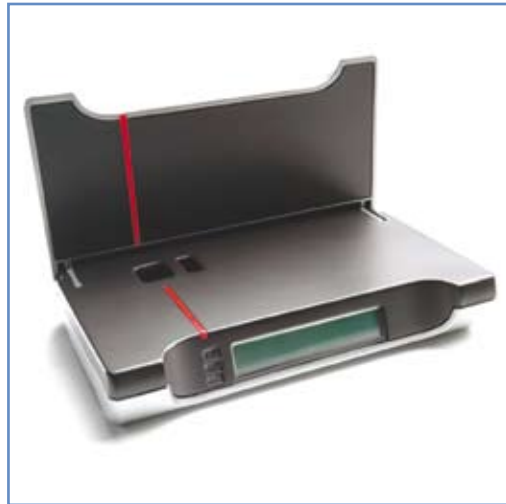


Figure 1
Lightweight, handheld and pocket-sized, the Payne Security reader is ideal for 'in the field' deployment by company personnel, customs officials or authorised agents.

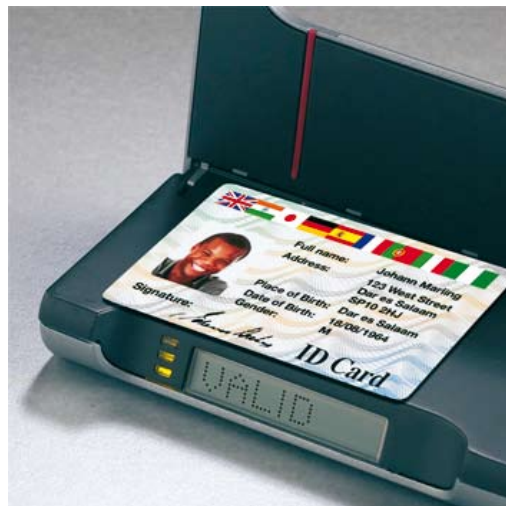


Figure 2
The Payne Security reader uses a specially developed detection method to authenticate the taggant on documents and products.

Tax stamps

Customs and excise revenue is of vital importance to the economy, and tax stamps are used by governments around the world to confirm the authenticity of imported goods. This very source of revenue is, of course, also attractive to criminals, who can make huge amounts of money counterfeiting goods or shipping genuine goods via countries with lower tax tariffs. The protection of genuine tax stamps therefore presents finance ministries around the world with a major challenge. A counterfeit stamp makes it difficult for governments to determine whether tax has been paid and, as a consequence, where untaxed goods are entering the supply chain. The extent of this problem is significant and it is estimated to cost governments billions of dollars in all-important tax revenue.

The potential health risk associated with consumable goods whose provenance cannot be assured also presents a threat. Because the public trusts branded products, there is a duty of care to protect the public from black market goods. Whilst tax stamps have

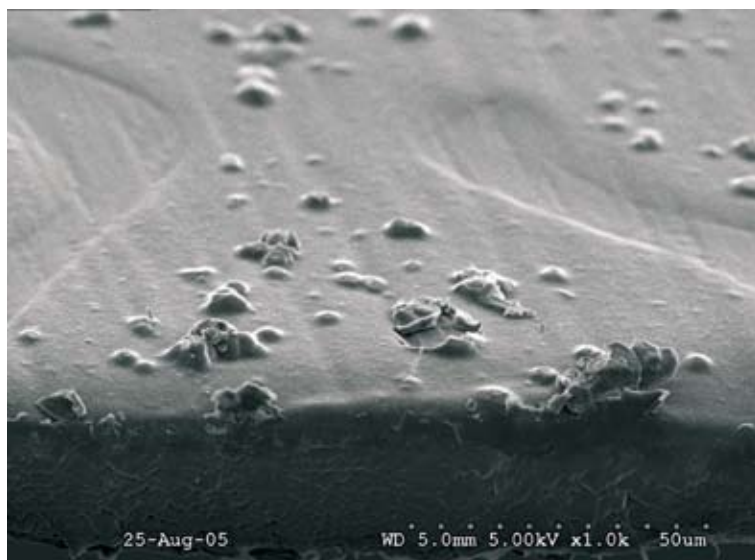


Figure 3
A typical taggant with large angular particles.

The taggants are included in the litho off-set ink used by the security printer contracted to manufacture the tax stamps.

ID documents

Taggants can also be used in combination with ID documents, such as passports, identity cards or driving licences. As such, the technology is increasingly used to create an additional level of traceability, allowing genuine documents to be verified. To give an example, many countries use a decentralised - and sometimes separate - system for the issuance of driving licenses. In turn, this may attract the attention of counterfeiters. Under such circumstances, the federal government may (want to) provide a central means of authentication in the form of highly effective and unnoticeable taggants.

Summary

A taggant is a valuable security solution that creates an additional level of authentication. The covert inclusion of taggants in value documents or products is easy to realise while their presence is straightforward to detect. In turn, this thwarts any attempt at counterfeiting and fraud.

been in use for centuries, even outdating postage stamps, they have, to some extent, been treated as the 'poor relation' of other government-issued security documents. As a consequence, they have attracted little investment in new technology. Because taggants are cost-effective, easy to apply and authenticate, and virtually impossible to detect, they provide an ideal solution. Payne Security currently supplies taggants to one European government for inclusion on its tax stamps. The stamps in question also feature a variety of overt features, including a complex print design and holograms. The overall solution provides field officers with easy-to-use authentication technology. The organisation has supplied a number of readers, which are distributed to authorised customs agents. Feedback indicates that the readers are highly valued because of their portability, quick response times and ease of use.

Figure 4
The Payne Security taggant with small spherical particles.

