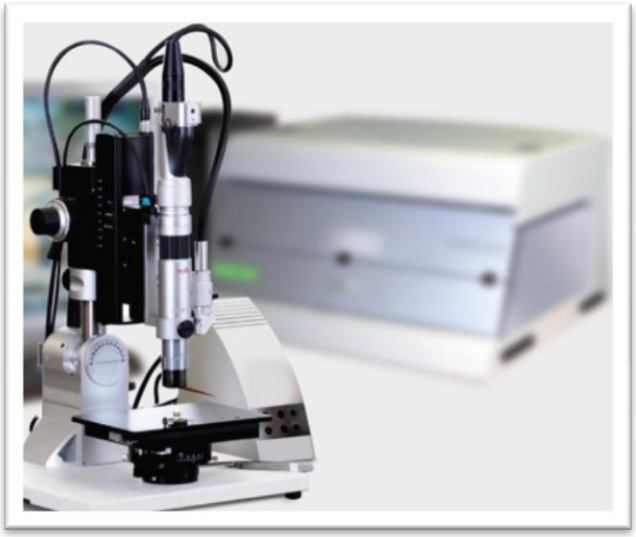
foster+freeman

APPLICATION NOTE

July 2010

Imaging Taggants with the VSC6000 External Microscope (DVM2000)



DVM2000 microscope for the VSC6000

There is an increasing trend in using optical taggants as a covert security feature in documents and valued products. The taggants are typically randomly distributed tiles ~100 microns in size and are inscribed with unique codes only a few microns high. Such small features are challenging to view and may require a range of illumination types to capture all the encoded information. A quality, very high magnification microscope such as the DVM2000 is needed for full analysis of taggants.

Example 1 OPTAGLIO® ID Card sample

In this first example octagonal taggants invisible to the naked eye are scattered over the letter O, as shown in figure 1.

Figure 1 Optaglio® ID card and magnified "O" showing taggants

The images of an Optaglio taggant shown in Figure 2 have been captured using the DVM2000 external microscope and x350-x3500 objective. Despite the small size of the taggant, the x10 zoom adjustment on the microscope makes finding and then magnifying a simple process. The microscope optics are optimised for digital imaging and long working distance objectives allow the use of ringlights and directional side lighting. The first image, captured under coaxial illumination reveals fine details

within the taggant. The second image, captured under directional side lighting from an external fibreoptic lightsource, reveals the diffractive nature of the taggant.

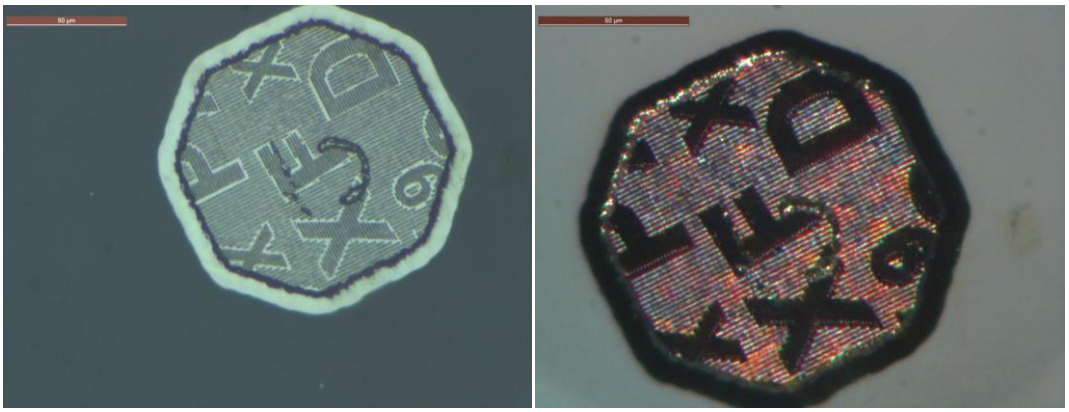


Figure 2 Optaglio® taggant images from the DVM2000 microscope under coaxial and side illumination

Example 2 JDSU Charms™ taggants in Secureshift® ink

JDSU Charms are a smaller, non-diffractive taggant and invisible to the naked eye (see figure 3).

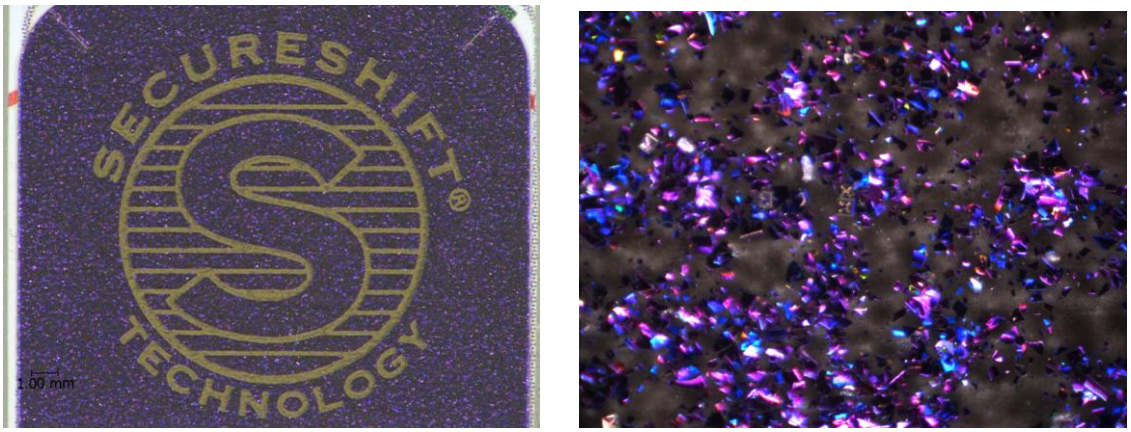


Figure 3 JDSU Charm sample and as imaged under low power on the DVM2000 using darkfield ringlight illumination

Refering to figure 4, the standard coaxial illumination on the DVM2000 provides a high contrast image of these taggants under full magnification, whilst the optional darkfield ringlight option provides an inverted image of the Charm inscription.

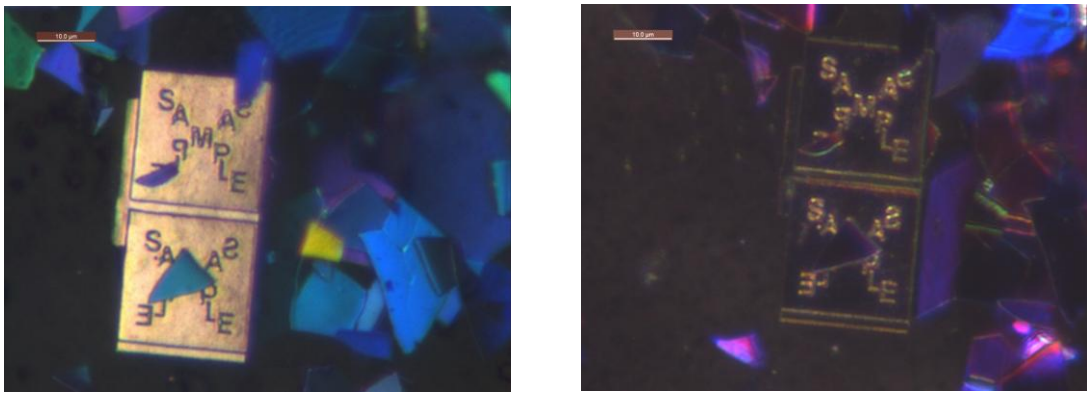
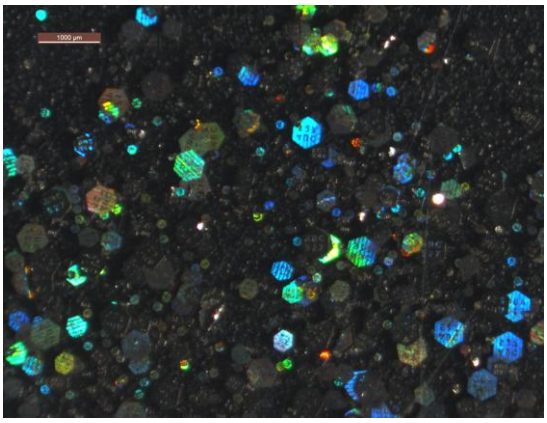


Figure 4 Full magnification DVM2000 images of Charms under coaxial and darkfield ringlight illumination

Example 3 Optaglio OVDot® HEXAGON

OVDot Hexagon taggants are diffractive in nature and vary in size up to ~500 microns diameter. Figure 5a is a minimum magnification image of an array of taggants taken using the optional x35-x350 objective and directional side illumination to highlight the diffractive nature of the taggant. The images of Figure 5b,c and d are minimum magnification images with the x350-x3500 objective under directional sidelighting, coaxial lighting and darkfield ringlighting respectively. Whilst directional sidelighting is optimal for diffractive effects, the coaxial illumination most clearly reveals the microtext on the taggant, which can be enhanced by image sharpening. Figure 5e is an enlarged image under coaxial lighting to more clearly show the revealed microtext.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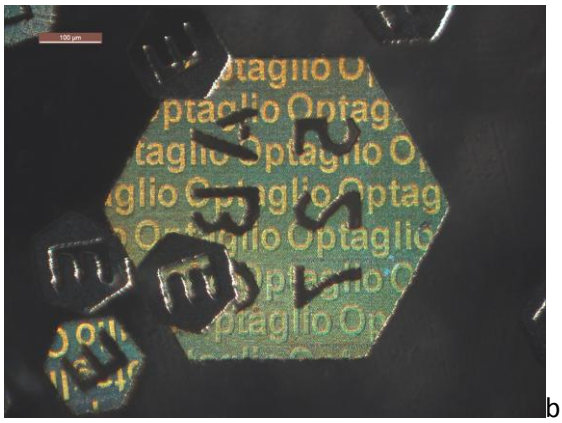
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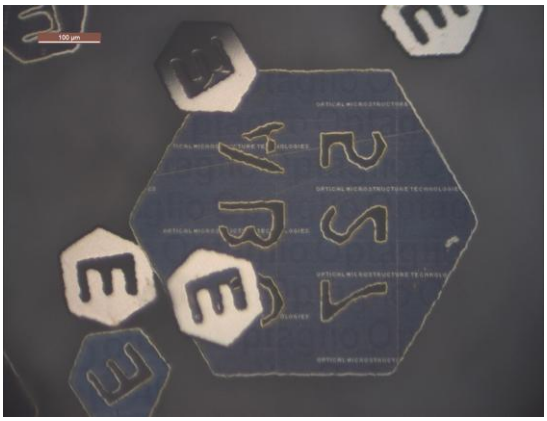
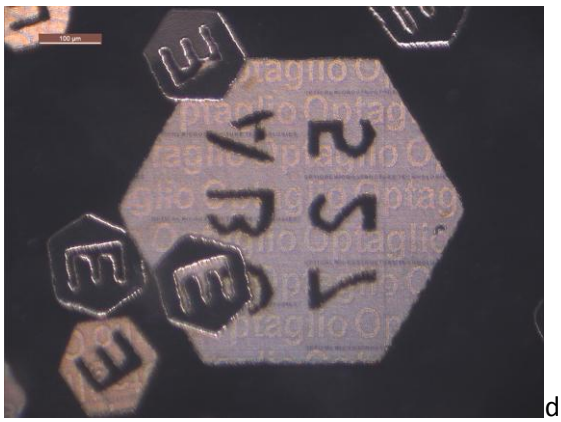

c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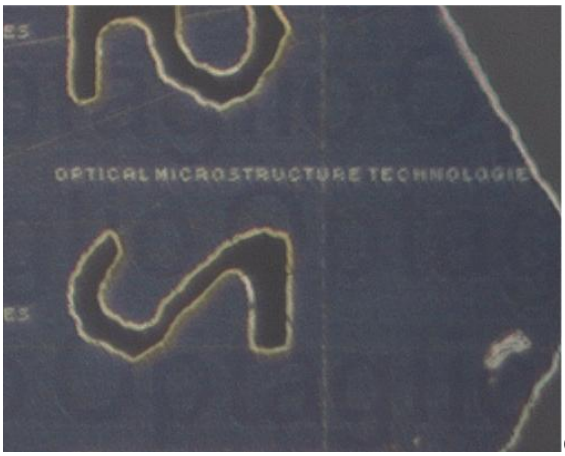

e

Figure 5 DVM2000 images of OVDot® Hexagons

Conclusion

The DVM2000 microscope is a powerful and effective system for detailed examination of optical taggants.

DVM2000 specification

- Digital video microscope with encoded 10x zoom
- Microscope-optimised 2.11 Mpixel colour CCD camera (Firewire B),up to 29 frames/second
- High power objective lens
    - 460-4600x magnification on 1:1 display (no digital magnification), 720-7200x full screen
    - Field of view 0.88-0.09mm
    - Long working distance of 10.6mm, to allow darkfield/ side illumination
- Low power objective lens
    - 41-390x magnification on 1:1 display (no digital magnification), 65-610x full screen
    - Field of view 9.83-1.05mm
    - Long working distance of 34mm, to allow darkfield/ side illumination
- Intense metal halide coaxial illumination, with variable aperture and polarising attachments
- 400mm focus column with coarse/fine focus drive, fitted to rotating incident light XY stage
- Software suite that interfaces with the microscope to automatically scale images
    - Software features include exposure, colour balance, gamma and shading controls
    - Point-to-point measuring
    - High Dynamic Range imaging
- Optional darkfield ringlight adapter, extreme magnification 920-10000x objective lens (no digital magnification)

Sales Support and Feedback - Foster + Freeman welcome feedback from Customers regarding this product. Please contact one of our offices if you would like to pass on your comments. Foster + Freeman are pleased to offer advice,installation, training and on-site maintenance worldwide for all of their products.

FOSTER + FREEMAN LTD
Vale Park
Evesham
Worcestershire
WR11 4PE
UK
☎ + 44 (0) 1386 768050
+ 44 (0) 1386 765351
sales@fosterfreeman.com
www.fosterfreeman.com

Head Office & UK Sales Office

FOSTER + FREEMAN
USA INC
46030 Manekin Plaza
Sterling
Virginia 20166
USA
☎ +1 888 445 5048
+1 888 445 5049
usoffice@fosterfreeman.com
www.fosterfreeman.com

US Sales Office