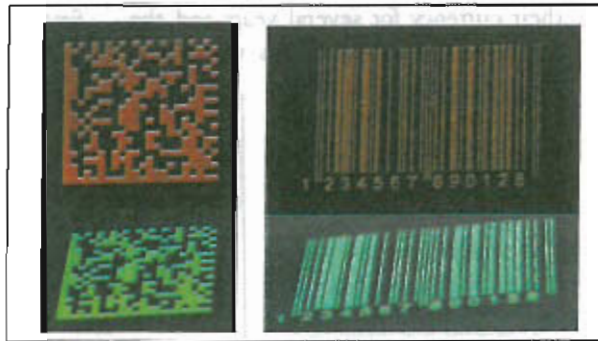


## ODS PRESENTATIONS

# Validus' Inkjet Printed Liquid Crystal Labels

Dutch company Validus Technologies, a spin-off from Eindhoven University, has created equipment, inks and substrates for inkjet printing liquid crystal (LC) materials on a commercial scale, defying previous attempts which have foundered on the large size of LCs relative to the inkjet nozzles. As Robert Vranken of the company told Authentication News®, they envisioned a need for new production methods for labels to allow for a high level of security, but also to accommodate digitally driven systems to process variable data. To this end they developed an inkjet technology able to print optically variable devices based on liquid crystals (LC), providing overt, covert and forensic security within one device but also containing variable or personalized data.

To be able to inkjet print liquid crystalline materials two key issues were addressed: the alignment of LC's confined in droplet geometries and the interactions of LC materials with anisotropic substrates governing these droplet geometries. Validus can produce labels providing four levels of security through a single printed layer of ink.



*Photographs of inkjet printed colour shifting features, on the left a 2D datamatrix, on the right a barcode. The top images are taken under a 10 degree angle, the bottom images at greater angles*

These are:

**Overt:** The color of a print is angular dependent. When the print is tilted, the color of the feature shifts showing a rainbow effect;

**Covert:** The overt print can be made invisible by using a special polarizing filter;

**Forensic;** The forensic level is achieved by traceable molecules which

can only be detected through laboratory analysis;

**Biometric/variable data:** features at this level contain unique data such as biometric information or unique barcodes which are used for tracking and tracing.

Printing from several ink reservoirs can be used to create multi-colour OVD's with several security levels. The flexibility of the chosen inkjet printing production method in combination with LC inks and other materials, creates a gamut of security features with differentiated security value levels, while maintaining design freedom to create attractive features.

Controlling the alignment of liquid crystals in the typical droplet shapes created when inkjet printing LC materials on anisotropic surfaces is very difficult but has been achieved in a way that can also produce polarization effects. Validus typically prints on the underside of a plastic substrate, thus protecting the print from accidental scuffing or abrasion and also from deliberate tampering.

Contact: [www.validus-technologies.com](http://www.validus-technologies.com).



*An image showing the high resolution of Validus' inkjet-printed liquid crystal images and the unambiguous multi-colour-shift*