Proceedings of the Conference on Optical Document Security II
Palace Hotel, San Francisco, 20-22 January 2010

Conference Chair/Editor: Rudolf L. van Renesse, VanRenesse Consulting (The Netherlands)
Programme Committee: Sara E. Church, Federal Reserve Board (USA); Paul G. Coombs, JDSU Flex Products Group (USA); Douglas S. Dunn, 3M Safety, Security, & Protection Services Lab (USA); Quazi T. Islam, Astute Protection (USA), Malcolm R. M. Knight, De La Rue International Ltd. (UK); Ian M. Lancaster, Reconnaissance International (UK); Robert A. Lee, Consulting Physicist (Australia); Volker Lohweg, Ostwestfalen-Lippe University of Applied Sciences (Germany); Gary Power, Security International (Australia); Sijbrand Spannenburg, Joh. Enschede Security Print (Netherlands); Wayne R. Tompkin, OVD Kinegram Corp. (Switzerland); Tsuyoshi Uematsu, Research Institute, National Printing Bureau (Japan)

Conference Website: http://www.opticaldocumentsecurity.com

TIP: for ease of navigation, open bookmarks with author names

### 21 JANUARY 2010 – SESSION I: CURRENCY I

#### SESSION CHAIR: Sara Church – Federal Reserve Board (USA)

**Innovative Approaches to the Selection of Banknote Security Features**

Hans de Heij, De Nederlandsche Bank (DNB) – The Netherlands

Shortly after the introduction of the euro, DNB developed the so called simple model to keep track of the quality of the incoming counterfeits. One of the findings is that - on a scale of 0 to 12 - the average quality of counterfeits is 7 points. How may this be explained? And what does this mean for future feature selection?

**From Feature to Sensor - A Flexible Measurement Platform for Statistical Process Control**

Thomas Türke, KBA-Giori S.A – Switzerland

Providing adequate measuring devices is today an integral part of the development for new machine readable security features. Preferably these sensors are well integrated into the existing measurement concept, with defined data interfaces for reporting instead of using stand-alone devices with proprietary interfaces.

**Document Production and Verification by Optimization of Feature Platform Exploitation**

Volker Lohweg, Ostwestfalen-Lippe University of Applied Sciences – Germany

The intaglio process is important for the security of banknotes, but direct measurement of its 3D structures under the rough and challenging conditions of circulation have proved to be difficult. In terms of signal processing, the fine structures of intaglio technique can be considered as areas of interest with certain ranges of spatial frequencies. Therefore, a new algorithmic approach, which is especially able to detect the intaglio structures and their intrinsic characteristics, has been explored and developed.

**New Level of Optical Measurement and Inspection in Intaglio Plate Making and Printing**

Thomas Kern, Austrian Banknote Printing Works (OeBS) – Austria

Intaglio printing is a real 3D printing process that needs high resolution 3D measurement equipment for further developing the printing process and proper quality analysis. A new measurement device with a unique combination of 3D data and true color information as well as sample measurements will be presented.

### 21 JANUARY 2010 – SESSION II: CURRENCY II

#### SESSION CHAIR: Malcolm Knight – De La Rue (UK)

**A Method for Quantitatively Determining the Security Effectiveness of Bank Note Security Features and Whole Notes**

Erik Balodis, Bank of Canada – Canada

Many security features are available from suppliers today, and central banks have the difficult task of selecting one or several of these features for integration into their banknotes, taking into account security, usability and durability. The Bank of Canada has developed a methodology for estimating the usability of security features in circulation through a series of laboratory tests which indirectly measure their effectiveness.

**Fitness Check of Soiling for Circulating Banknotes**

Armin L. Stöckli, BEB Industrie-Elektronik AG – Switzerland

Soiling levels of banknotes are a key factor in automatic fitness checking. Therefore, circulating euro banknotes of different soiling degrees were measured densitometrically and compared with framework and test decks. This presentation shows how significant deviations were observed.

**A Photopolymer-based OVD for Banknote Applications**

Wayne R. Tompkin, OVD Kinegram Corp. – Switzerland

Volume holograms display attractive and secure visual effects. Many barriers precluded their implementation on banknotes, including durability in circulation, integration into the banknote production chain, cost of integration, and compatibility with cash handling. We have now developed, manufactured and tested a photopolymer-based OVD, specifically for banknote applications.
### 21 January 2010 – Session III: Substrate & Printing I

**Session Chair:** Volker Lohweg – Ostwestfalen-Lippe Univ. of App. Sciences (Germany)

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**Session Chair:** Sijbrand Spannenburg – Joh. Enschedé Security Print (The Netherlands)

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Multi-Color, Three-dimensional Floating Image Overt Security Features

Douglas Dunn, 3M Safety, Security, & Protection Services Lab – USA

3M has developed a process for creating three dimensional images that appear to float above and/or below the surface of a substrate. This technology was originally scaled up to produce black-and-white images in Confirm™Retroreflective Security Laminate. Recently, a new technology has been developed for producing two color floating images, which include a laser-written kinetic microtext covert feature.

Dynamic 1-D Moiré Features for Banknote and Document Security

Andreas Schilling, OVD-Kinegram Corp – Switzerland

Optically variable 1-D moiré features are developed, dedicated to banknote and ID-card applications. Sample banknotes are presented and polycarbonate cards that display novel movement effects when tilted. Several examples are shown, including variants where the animated moiré features are combined with other visual first-line effects.

Analysis and Future of Novel Anti-counterfeiting Micro-optic Security Features

Samuel M. Cape, Crane Micro-Optic Solutions – USA

Unison® is a class of micro-optic security films that use micron-scale geometrical optic systems to present striking visual effects. These films are devices which take full advantage of moiré magnification and integral imaging. This paper will qualitatively describe some of the effects that are possible with Unison, compare their potential effectiveness when used in different formats, and give a look into the future of what is possible with this technology.

Novel Method to Arrange Microstructures for Moiré Magnifier Type Security Features

Michael Rahm, Papierfabrik Louisenthal GmbH – Germany

Astonishing visual effects can be achieved by placing an array of microstructures in the focal plane of an array of microlenses. We will discuss a new method for arranging the microstructures, which can be described with a simple mathematical formula based on a modulo-algorithm together with linear mapping.

Interactive Photonic Crystal Security Devices

Andre C. Arsenault, Opalux Inc. – Canada

Photonic crystals (PCs) incorporating active materials display bright color reflections tunable through the visible spectrum. The color platform includes materials with thermally and mechanically tuned colors, and the process also allows color changes through the peeling off of a transparent top-sheet, and the display of the temperature history of an article through permanent color changes.

Color Shifting Multilayer Polymer Fibers and Security Articles Containing Color Shifting Multilayer Polymer Fibers

Bruce Wilson, 3M Security Systems Division Laboratory – USA

3M has developed proprietary multilayer optical fibers. The technology enables an easily observed color response shift when viewed in reflection versus transmission, with the color response based on constructive interference of a multitude of layer pairs. The combination of different polymer pairs, with different refractive indexes, number of layers and optical layer thickness impart different color responses to the fiber. Polarizing effects may also be achieved. If the selection includes a semi-crystalline polymer such as PET, the resultant fiber can be robust enough to be woven into an article, and possesses forensic features as well.

New Materials for Use in Liquid Crystal Security Products

Robert Hammond-Smith, Merck Chemicals Ltd. – UK

This paper will describe the chemical, physical and optical properties of liquid crystal materials in general and then introduce new materials developed by Merck. Examples of how these materials allow better control of printing behavior and optical properties will be given.
### 22 JANUARY 2010 – SESSION VII: DIGITAL RECORDING AND MACHINE READING

**SESSION CHAIR: Ian M. Lancaster – Reconnaissance International (UK)**

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### 22 JANUARY 2010 – SESSION VIII: IDENTIFICATION AND AUTHENTICATION

**SESSION CHAIR: Paul G. Coombs – JDSU Flex Products Group (USA)**

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This paper was not orally presented but is included in the Conference Proceedings.