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Success story

Counterfeit-proof banknotes



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A new security element for banknotes and other documents has been developed by the nanotech company Rolic. Thanks to a new production process, the high resolution dual-coloured elements can now be produced en masse – and may soon replace holograms on banknotes.

It is still not easy to produce banknotes which cannot be counterfeited. But we could soon be handling the newly developed optical elements, produced by Swiss nanotechnology firm Rolic Technologies Ltd. in Allschwil, every day, when they replace the current holograms.

At the "Banknote Conference 2011" in Washington DC, the specialist audience already had an opportunity to admire the new optical security elements. In order to make banknotes even more difficult to counterfeit, Rolic employs a new type of process for optical security elements. These 'Sapphire' products make it possible to reproduce defined colours and clear colour changes at high resolution. The effect can be seen with the naked eye and no technical aids or special training are required to establish that notes are genuine. The security elements cannot be counterfeited: the special optical effects can neither be scanned nor copied. This makes them more secure than holograms, which are currently found on most banknotes; a hologram reproduced by skilled counterfeiters can barely be

distinguished from the original. This should no longer be possible with the new elements.

Liquid crystals increase security

The development of optical security elements is based on the light-based spatial alignment of liquid crystals, or LCMO technology. Liquid crystals, which are also used in LCD screens, are structured in the nanometre range using polarised light. Unique optical effects are created on surfaces altered in this way: single- or multi-coloured images with a clear change between positive and negative, with-



Banknotes can be made even more secure with the new Sapphire security element.



“These ‘Sapphire’ products make it possible to reproduce defined colours and clear colour changes at high resolution.”

Mohammed Ibn-Elhaj, Head of the New Technologies Division at Rolic and initiator and project manager for the CTI project

out the typical rainbow effect of holograms. Microscopic structures called microarrays are used to produce such images.

Complex production process

The NTB Technical University in Buchs helped Rolic develop a production process for these microarrays in a one-year CTI project. Using a dry etching process, the macrostructure is transferred to a suitable material. This is then used in further production steps, until a finished label has been produced.

Thanks to this project, sample banknotes with this changing dual-colour effect have been produced for the first time. Julien Martz, head of the development department at Rolic’s Security Business Unit, who was responsible for the technical implementation of the CTI Sapphire project, believes the new security elements have huge potential: “Sapphire has not yet been used in a product, but we are at an advanced stage of negotiation with clients such as central banks, who are showing considerable interest.”

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