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Research area: Product aims

End products made of paper, paperboard and board // Print products

Key words:

Printing ink, sol-gel, bioactive, antigen safety feature, product safety

Title: Novel product protection by antigen-antibody reaction using nanosol-immobilization on paper**Background/Problem area**

Product counterfeiting and piracy have become a serious economic problem in nearly all markets. Affected amongst others are the pharmaceutical industry, the automobile industry (spare parts) and the cosmetics industry. The International Chamber of Commerce reckons that the damage to brand manufacturers due to piracy and counterfeiting is in the range of \$600 billion worldwide. In Germany the economic damage is in the range of €142 billion and up to 70.000 jobs are potentially endangered. Not only large enterprises but increasingly small and medium enterprises that can scarcely protect their products and intellectual property are affected.

In the fight against counterfeiting and piracy individual safety features gain a more vital role as counterfeiter especially in the Asian region forge not only the product but also the safety features itself: A technically "good" hologram has a "half-life" of approximately one week. A study on behalf the International Chamber of Commerce showed that companies already use more than 50% for antipiracy technologies of their available means. This is why the need for more complex safety features is in demand and continuously growing.

Objectives/Research results

The objective of the project is to develop a printing ink that contains a safety feature to protect products against counterfeiting. The ink will be composed of sol-gel materials and bio molecules. As the safety feature will be transparent it can be applied onto existing features.

Inorganic oxidic nanosols are able to immobilise bioactive reagents, bio molecules and even living cells into a MO_x -matrix; maintaining to a large extent the conformation as well as the chemical and physical properties of these substances. This characteristic of sol-gel matrices enables the immobilised substances to react with external reagents. Therefore the bio molecules can be identified through the reaction with antibodies by an immunoassay, e.g. an ELISA Test. These immunoassays are very easy to use, fast and highly specific. To solve the code of bio molecules however is very difficult as protein analyses are still very expensive and complex.

In the first step different sol gel systems were selected and formulated in order to have operational and stable systems for the compatibility screening. Next different antigen-antibody kits were selected and examined. Especially the required quantity and cost analysis in sol gel systems were of interests. First tests regarding the shelf-life showed promising results. For example the result of an immunoassay of a sol-gel coating with 0.003% antigen on paper (after 8 weeks storage; coating weight: $\sim 3g/m^2$) was still positive. In the last phases of the project the shelf-life of the bioactive sol-gel systems as well as their application using offset, flexographic or digital printing will be further optimised.

Application/Economic benefits

This research projects creates a new safety feature that ensures an effective product protection. Using this novel safety feature companies will be able to gain back market shares by preventing product counterfeiting and piracy. In addition to this there will be indirect cost savings resulting from the prevention of prestige losses as well as the reduction of product liability and knowledge loss.

The safety feature will be applied onto the packaging enabling the use of other features due to its transparency. If successful it will play a vital role in product production and not be restricted to just the packaging as the use on products e.g. fabrics is conceivable.

Project period: 01.01.2009 – 31.12.2010

Remarks

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