

NOVEL TECHNIQUE TO ENHANCE THE SECURING LEVEL OF SECURITY PAPER USING THE SUPERPARAMAGNETIC FINGERPRINT OF MAGNETIC NANOPARTICLE DISPERSIONS → NANOMAG-SECURITYPAPER

Goal of the project

Security paper is among the most important ingredients used in the fight against the forgery of private or public documents. The continuous diversification and sophistication of the paper securing techniques is one of the most important ways to erect fences against forgery attempts. The NanoMagSecurityPaper project aims to expand the diversity of high tech means for paper securing. The general objective of the project is to elaborate a new paper securing technique based on the superparamagnetic fingerprint of magnetic nanoparticles made of oxide compounds.

Short description of the project

The objective of the project is to elaborate a new paper securing technique based on the superparamagnetic fingerprint of the magnetic nanoparticles.

Project implemented by

- Romanian Academy – Timisoara Branch (C0)
- SC CEPROHART SA (P1)
- SC ROSEAL SA Odorheiu Secuiesc (P2)
- SC Datronic – NCIP SRL (P3)
- National Institute of R&D for Izotopic and Molecular Technologies Cluj-Napoca (P4)
- Politehnica University of Timisoara (P5).

Implementation period

01.07. 2014 – 30.06.2016

Main activities

1. to elaborate superparamagnetic paper assortments with
 - 1.1 low security level, using polydisperse magnetic nanoparticles,
 - 1.2 high security level, using bidisperse magnetic nanoparticles, an
 - 1.3 white color, using core-shell (core/magnetic, shell/polymer) particles.
2. to elaborate and test the authentication method using the magnetogranulometry technique applied to
 - 2.1 static magnetometry
 - 2.2 dynamic magnetometry.

Results

1. Synthesis and magneto-optic characterization of monolayer stabilized magnetic nanoparticles with oleic acid
2. Synthesis and magnetic, TEM and FTIR characterization of magnetic nanocomposites embedded in three type of oxide matrices:
 - SiO₂ based magnetic nanocomposites;
 - TiO₂ based magnetic nanocomposites;
 - ZnO based magnetic nanocomposites.

Applicability and transferability of the results

The new method of securing paper using the superparamagnetic nanoparticles can be transferred to SC Ceprohart SA Braila. The transfer will contribute to:

- diversification of the product made in the national paper industry with simple brown paper secure and secure complex white paper,
- orientation of national industry to obtain a special paper grade with high complexity,
- increase the security level of specialty papers, difficult to fake on the internal market
- reduce the imports of security paper
- increase output and thus sales of security paper from Ceprohart.

Financed through/by

UEFISCDI

Research centre

Research Centre for Engineering of Systems with Complex Fluids – Laboratory of Rheology and Magnetometry, from Politehnica University of Timisoara.

Research team

Dr. Vlad SOCOLIUC, the director of the NanoMagSecurityPaper project
Phys. Oana MARINICA
Dr. Phys. Aurel ERCUTA
Dr. Phys. Catalin MARIN
Res. Assist. Florica BĂLĂNEAN
Res. Assist. George GIULA.

Contact information

Phys. Oana MARINICA
Research Center for Engineering of Systems with Complex Fluids,
Laboratory of Rheology and Magnetometry
Bd. Mihai Viteazu No. 1, RO300223, Timisoara,
Tel.: (+40) 256 403700; (+40) 256 403701
Fax: (+40) 256 403700
E-mail: attila.gonczy@upt.ro
Web: <http://mh.mec.upt.ro/ccisfc/>
Dr. Vlad SOCOLIUC
Romanian Academy – Timisoara Branch
e-mail: vsocoliuc@gmail.com