



HARDECOAT

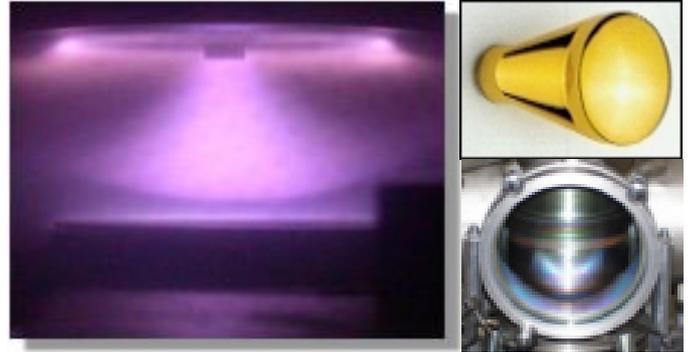
development of new hard decorative coatings based on transition metal oxynitrides



The Hardecoat project aims at developing **new functional coatings** for **decorative** and **micro-optoelectronics applications**. The coatings based on **transition metal oxynitrides** are deposited by **Physical Vapour Deposition (PVD)** techniques, especially by reactive sputtering. The idea is **to combine** the excellent mechanical properties of the **nitrides** with specific optical characteristics of the **oxides**. By tuning the deposition conditions, coatings with **composition varying from oxides to nitrides** are reached, exploring the unknown and vast spectrum of oxynitride thin film compounds.

Project deliverables

- ✓ A **clean** and **environment-friendly** process (no waste disposal, no hazardous gas emission, no water, soil and air pollution)
- ✓ An **extremely versatile** process allowing significant variation of the coating properties
- ✓ To develop **safe** and **cheap coatings** (reduction of materials content, materials price and increased lifetime of the products)



The coatings will be deposited by Physical Vapour Deposition techniques mainly by reactive sputtering. Since conventional reactive sputtering with a simultaneous injection of two gases (oxygen and nitrogen) is not a suitable process to deposit metal oxynitride coatings, an original deposition technique will be developed. Based on the already acquired pre-existing know-how on Reactive Gas Pulsing Process (RGPP), this process will be further developed and implemented for the deposition of TM-O-N coatings with adjustable and flexible chemical compositions.

POTENTIAL IMPACT

Surface treatment and coating industry (annual market of 25 billion € and 200 000 employees in Europe) play a key role in various industrial branches (biomedical, food, microelectronics, automotive, aerospace).

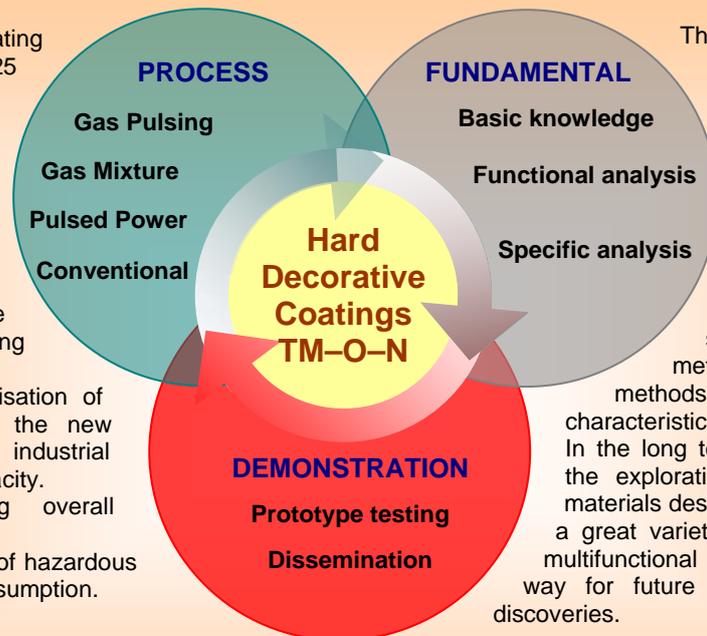
The project significantly contributes to the sustainable development and the following EC priorities:

- ✓ Contributing to modernisation of industry and adaptation to the new economy through improved industrial capability and innovation capacity.
- ✓ Substantially improving overall quality within the value chain.
- ✓ Minimising wastes, use of hazardous substances and resource consumption.

INNOVATIVE OUTPUTS

The project proposes a complete technological solution, which will increase the productivity by lowering production costs (environment-friendly process reduces recycling costs).

This project will initiate a long-term innovative systematic study on other metal oxynitride coatings, methods of deposition, their characteristics and potential applications. In the long term, this project will initialise the exploration of new horizons in the materials design. A possibility to synthesise a great variety of oxynitride coatings with multifunctional properties will open up the way for future scientific and technological discoveries.



The main industrial impact of the project is expected to be in the decorative surface treatment sector. Yet, the versatile applicability of the oxynitride coatings will open markets in the area of biomedical products (implants, surgical tools), optical components (filters, solar absorbers, electrochromic windows) or microelectronics.

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<http://hardecoat.ens2m.fr>

Contract number : NMP3-CT-2003-505948

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End date : 31/01/07

Project cost : 2 922 339.6 €

EC funding : 1 546 731.7 €

Project Coordinator

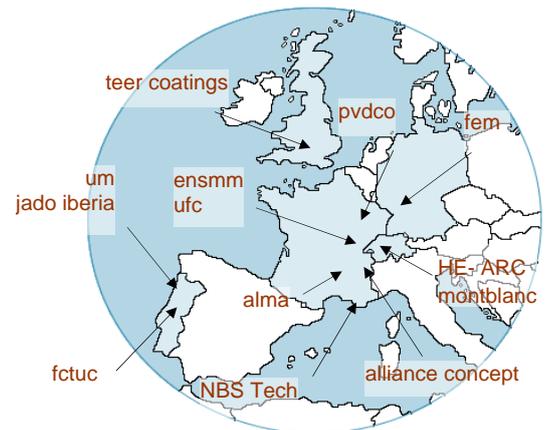
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Supported by the European Commission through the Sixth Framework Programme "Nano-technologies and nano-sciences, knowledge-based multifunctional materials, and new production processes and devices – NMP"

The Project Team

The HARDECOAT consortium is composed of 13 partners coming from 5 European countries. There is a core of 6 research institutes, 6 industrial partners and 1 consulting company



Ecole Nationale Supérieure de Mécanique et des Microtechniques - ENSMM

Besançon, France

www.ens2m.fr

Coordination of the project, Reactive Gas Pulsing Process development, structural and electrical characterisation.



Haute Ecole ARC - Department of Microtechnics and Optoelectronics - HE ARC

Le Locle, Switzerland

www.eiaj.ch

In-depth chemical composition analysis, optical properties, mechanical and tribological characterisation.



Forschungsinstitut für Edelmetalle und Metallchemie - FEM

Schwäbisch Gmünd, Germany

www.fem-online.de

Pulsed Power Magnetron Sputtering, microstructural characterisation, degradation and corrosion resistance analysis.



Université de Franche-Comté - UFC

Montbéliard, France

www.univ-fcomte.fr

Structural analysis, colour measurements.



Faculdade de Ciências e Tecnologia da Universidade de Coimbra - FCTUC

Coimbra, Portugal

www.fct.uc.pt

Microstructural characterisation, mechanical and tribological characterisation, thermal treatments.



Universidade de Minho - UM

Braga, Portugal

www.fisica.uminho.pt

Reactive Sputtering with Gases Mixture, mechanical and tribological characterisation, thermal treatments, structural analysis.



PVDco SARM - PVDco

Nancy, France

Process and coatings testing (end user).



NBS Technologies SAS - NBS

Rousset, France

www.nbstech.com

Coatings testing in microelectronics.



Alliance Concept SARM - AC

Cran Gevrier, France

www.alliance-concept.com

Process and coatings testing (end user).



Teer Coatings Ltd - TCL

Droitwich, UK

www.teercoatings.co.uk

Coatings testing.



Jado Iberia Produtos Metalurgicos SA - JDI

Braga, Portugal

www.jado.pt

Coatings for decorative applications.



Montblanc Montre SA - MB

Le Locle, Switzerland

www.montblanc.com

Coatings for watch making industry applications.



ALMA Consulting Group - ALMA

Lyon, France

www.almacg.com

www.prodige.com

Administrative and financial management.

