

## Projet FP7 – CORRAL

Nom du projet	Corrosion protection with perfect Atomic Layers - CORRAL
Call	NMP-2007-2.1-2
Type de projet	Small or medium-scale focused research project
Rôle de la HES-SO	Coordinateur
Chercheur impliqué	Erich Bergmann (hepia)
Participants	Haute Ecole Spécialisée de Suisse occidentale (Switzerland) – coordinateur; Linde ag (Germany) ; Schaeffler kg (Germany) ; Schaeffler technologies gmbh & co.kg (Germany) ; Helsingin Yliopisto (Finland) ; Diarc Technology oy (Finland) ; Hauzer Techno Coating b.v. (Netherlands) ; Picosun Oy (Finland) ; Forschungsinstitut Fur Edelmetalle und Metallchemie (Germany) ; Muszaki Fizikai es Anyagtudományi Kutatóintézet - Magyar Tudományos Akademia (Hungary); Tartu Ulikool (Estonia) ; Centre National de la Recherche Scientifique (Cnrs) (France) ; Messier-Bugatti Sa (France) ; Sheffield Hallam University (United Kingdom) ; Technische Universiteit Eindhoven (Netherlands).
Budget global	4.73 millions euro / financement UE : 3.38 millions euro
Durée	36 mois, début le 1.9.2008
Résumé	<p>The aim of this project is to develop high density defect-free ultra-thin sealing coatings with excellent barrier properties and improved corrosion resistance. Their successful functioning will be provided by the synergy of the coating “perfect” morphology and its complex structural design, which can be tailored at the nanoscale.</p> <p>The study will be focused on development of novel nanostructured coating systems, such as nanoscale multilayers, mixed and composite coatings. These impermeable sealing layers must be able to block the ion exchange between the substrate material and an aggressive environment, thus offering an efficient protection against corrosion over a long term. The coatings will be deposited by four alternative vapour deposition techniques, Filtered Cathodic Arc Deposition (FCAD), High Power Impulse Magnetron Sputtering (HIPIMS), Atomic Layer Deposition (ALD) and Plasma Enhanced Atomic layer Deposition (PEALD)). These techniques possess a unique advantage offering the deposition of highly conformal and uniform films of high density, free of defects.</p> <p>The technological objective of the project is to demonstrate the feasibility of corrosion protection by FCAD, HIPIMS and ALD techniques on an industrial scale. To fulfill this objective, a complete industrial process for the multi-stage surface treatment, including cleaning, pre-treatment, coating deposition, must be defined. All techniques will be evaluated in terms of technical effectiveness, production costs, environmental impact and safety, and the most suitable</p>

technique(s) will be selected for further development on a large scale for the applications in some targeted industrial sectors. The applications, tested within this project, concern high precision mechanical parts (bearings), aerospace components (break systems) and gas handling components. The coating application in the decorative and biomedical domains will be assessed.

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