AVCOP:
ADDED-VALUE FOR METALLIC COATED PRODUCTS BY NEW SOL-GEL PROCESS

AVCOP supports small manufacturing enterprising companies to re-define their product offer in the market for metal finishing applications with added-value surface solutions

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The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under the GA n° 315041

External Advisory Board

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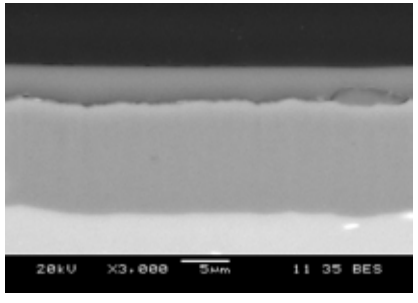
EXPECTED GOAL

AVCOP proposes to enable eight small manufacturing enterprising companies to re-define the product offer in the market for metal-finishing applications. The project seeks to develop highly innovative nano-structured sol-gel & ionic liquid enabled coatings to seal and protect anodised aluminium, hot-dip-galvanised steel and electroplated zinc components.



Sol-gel onto anodised Al

OBJECTIVES

Innovative surface treatments will offer the market levels of wear-resistance, corrosion protection and aesthetic appearance that exceed the best standards available today.

Colour sol-gel onto HDG rail ends

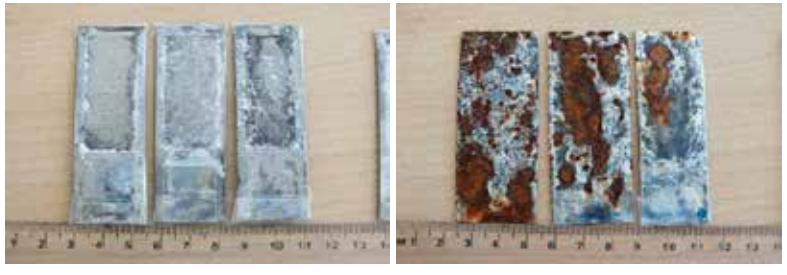
- Develop new ionic liquid-assisted sol-gel coatings to address the specific needss of the HDG, electroytic Zn and Al Anodising industries.
- Investigate the impact of a range of IL's on forming protective coatings while minimising VOC output.
- Optimise the sol-gel/IL formulations using standard performance enhancing additives.
- Examine the production of sol-gel technologies at pilot scale levels.
- Optimise the coating application performance using energy efficient processes.
- Validate the new technologies at prototype and small industry scales.
- Conduct full safety and environmental impact assessments of the new coating systems.

WORKPACKAGES

- **WP1:** Definition of materials and process requirements
- **WP2:** Development of IL/sol-gel coatings
- **WP3:** Processing and deposition of coatings
- **WP4:** Testing and validation
- **WP5:** Environmental and cost assessment
- **WP6:** Scale-up and technology implementation
- **WP7:** Dissemination and exploitation
- **WP8:** Project management

PROGRESS OF WORK

A series of IL/Sol-gel formulations have been examined by all RTD's



Zn electroplated steel + CrIII passivation with (left) and without (right) sol-gel after 1500 hours of salt spray test

- IL solubility varied significantly depending on the character of the cation/anion.
- The rheology of the formulations varied with solubility.
- The hydrolysis of the sol-gel is affected by the level of IL.

Anodised AA2024-T3 with sol-gel after 1000 hours of salt spray test

- Based on this data preferred formulations for each application have been proposed.
- A series of corrosion inhibitors and pigments are being trialled.
- Application trials using the SME's substrate product are being completed either on-site at the SME or under the SME direction at the RTD.
- The results to date indicate that the process conditions are very important on the final coating properties.
- Factors such as application temperature and rate as well as cure temperature play an important role.
- The new coating systems are being characterised against each other and the current industry standards with promising results.