

Date : 23/02/2018

PhD thesis proposal – CIFRE ARCELORMITTAL
(September 2018 – September 2021)

Title : Understanding the adhesion mechanism of new epoxy crash generation on steel for automotive industry

Team :

- ArcelorMittal Global R&D - Montataire
- ArcelorMittal Global R&D - Maizières
- IS2M laboratory- Mulhouse (<http://www.is2m.uha.fr>)

Subject description :

ArcelorMittal is developing new coatings; new surfaces for automotive industry which must present good compatibility with the adhesives that are applied in the body shop on vehicle parts. By the increasing of the use of multimaterials in the vehicle for lightweight reasons, the carmakers faced adhesion issues with the assembly of these multimaterials made of new surfaces, new metallic coatings. They asked the adhesive's suppliers to adjust their formulation in order to improve the adhesion on new surfaces. Therefore, new crash epoxy adhesives have been developed which contain adhesion promoters that favor the adhesion on these new surfaces.

The industrial objective of the thesis is to study the impact of these new crash epoxy adhesives at multiscale (from macroscopic to microscopic level) on the adhesion performance of the different coated surfaces. This will be achieved beyond several mechanical tests widely used in the automotive industry such as single lap, T-peel, impact peel test.

The scientific approach consists in studying the interactions between the adhesive and the metal oxides at the interface where different phenomena could occur: wetting, surface reactivity, diffusion, ... Therefore, an experimental study will be conducted on model adhesive and pure oxides to identify the key factors that could drive the adhesion mechanism using different surface analyses (XPS, dynamic wetting, AUGER, SIMS, FTIR, ...).

The thesis will be done mainly at IS2M laboratory with some business trips to ArcelorMittal laboratory for training in industrial environment. Applicants should have an engineer degree (or Master) in a relevant chemistry or material science discipline. An academic or practical international experience will be an advantage. Interest in surface chemistry, formulation and surface characterization is strongly recommended.

Competences: Physico-Chemistry Surface & Interface – Analytical techniques – Materials science engineering

Thesis responsible: Arnaud Ponche (IS2M) – Florence Bally Le Gall (IS2M) – Frida Gilbert (ArcelorMittal Global R&D)

Applications including a CV, cover letter and a copy of grades (last two years) should be sent electronically to Arnaud.ponche@uha.fr no later than March 30th, 2018.