**Development of a new Zinc-Iron-Tungsten bath for corrosion protection**

G.Guilbert1\*, M. Poelman1, M-E Druart1, M.-G. Olivier2.

1: Materia Nova ASBL, Rue de l’Epargne 56 B-7000 Mons, Belgium

 2: Service de Science des Matériaux, University of Mons, Rue de l’Epargne 56 B-7000 Mons, Belgium

*\* Corresponding author. E-mail: Gregory.GUILBERT@MATERIANOVA.BE*

Zinc deposits are widely used to electroplate steel, for example in the automotive industry, as sacrificial coatings. Nevertheless, under severe corrosive atmosphere zinc coating is not good enough. Zinc alloyed with iron is one of solutions because these alloys coatings are cathodic to pure zinc and anodic to steel substrate and show better corrosion protection. The maximum exposure time at neutral salt spray for this alloy is approximatively 600 hours without apparition of red rust.

Tungsten and its alloys are of interest because of their high corrosion resistance, thermal stability and good mechanical, magnetic and tribological properties. Besides, tungsten is one of the densest of metals.

Nevertheless, pure tungsten cannot be deposited alone and it can only codeposit with iron-group metals.

So, alloying Zinc-Iron with tungsten could improve coatings properties and probably lead to nanocrystalline structure.

Zn-Fe-W alloy coatings could be produced with different compositions and microstructures depending on the composition of the plating bath and the deposition parameters. Corrosion properties of coatings on a steel substrate were investigated using the neutral salt spray test and electrochemical techniques. Performance of these coatings was compared to Zn-Fe coatings. The electrodeposits were also characterized to analyse their surface morphology and surface structure by using scanning electron microscopy and XRD techniques..