

## Characterization of Zn-Ni Alloy Elaborated Under Low and High Magnetic Field Immersed in Corrosive Medium

**Authors :** Sabiha Chouchane, Azzedine Hani, Jean-Paul Chopart, Alexandra Levesque

**Abstract :** The electrodeposition of Zn-Ni alloy is mostly studied for its high degree of corrosion and mechanical properties. In this work, the zinc-nickel alloy coatings elaborated from sulfate bath have been carried out under low and high applied magnetic field. The effect of alloy structural parameters upon corrosion behavior is studied. It has been found that the magnetically induced convection changes the phase composition, promoting the zinc phase in spite of the  $\gamma$ -Ni<sub>5</sub>Zn<sub>21</sub>. Low magnetic field acts also on the morphology of the deposits as a levelling agent and a refiner by lowering the deposit roughness Ra and the spot size. For alloy obtained with low magnetic field (up to 1T) superimposition, surface morphology modification has no significant influence on corrosion behavior whereas for low nickel content alloy, the modification of phase composition, induced by applied magnetic field, favours higher polarization resistance. When high magnetic field amplitude is involved (up to 12T), the phase composition modifications are the same that for low applied B and the morphology is not largely modified. In this case, the hydrogen reduction current dramatically decreases that leads to a large shift of the corrosion potential. It is suggested that the surface reactivity of electrodeposited alloys depends on the magnetically induced convection that is efficient during the codeposition process.

**Keywords :** magnetic field, Zn-Ni alloy, corrosion, corrosive medium

**Conference Title :** ICMSE 2024 : International Conference on Materials Science and Engineering

**Conference Location :** Istanbul, Türkiye

**Conference Dates :** June 27-28, 2024