**Electrochemical and Raman analysis of the corrosion products formed over hot dip galvanized steel wires exposed in different environmental sites**

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**Figure S1. Raman spectrum of ZnO detected on pristine wire.**

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**Figure S2. Raman spectra of zinc oxide, zinc carbonate and hydrozincite detected on aged wires.**



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**Figure S5. Fitting results for (a) aged Belgium wires and (b) aged Indonesia wires in 0.1 M NaCl and 0.1 M Na2SO4.**

**Figure S6. Comparison of corrosion rates of the wires based on polarization resistance.**

**Table S1. Peak assignments for various corrosion products of zinc.**

|  |  |  |
| --- | --- | --- |
| **Compounds** | **Chemical Name** | **Main peaks (cm-1)** |
| ZnO | Zincite/Zinc oxide | 560 |
| ZnCO3 | Zinc carbonate | 1100 |
| Zn5(OH)6(CO3).2H2O | Hydrozincite | 1060 |
| ZnSO4.3Zn(OH)2 | Zinc hydroxy sulphate | 960 |
| ZnSO4.3Zn(OH)2.nH2O, n=3-5 | Hydrated zinc hydroxy sulphate | 980, 3500 |
| Zn4SO4(OH)6.4H2O | Namuwite | 960, 3610 |
| Zn5(OH)8Cl2.H2O | Simonkolleite | 250, 395, 3490 |
| Mix CO3-SO4-OH | - | 980, 1060, 3500 |

**References for Raman peaks assignment:**

1. Colomban, Ph.; Cherifi, S.; Despert, G.; Raman identification of corrosion products on automotive galvanized steel sheets, Journal of Raman spectroscopy, 39 (7), 2008, 881-886.
2. Falgayrac, Guillaume; Sobanska, Sophie; Bremard, Claude;Raman diagnostic of the reactivity between ZnSO4 and CaCO3 particles in humid air relevant to heterogeneous zinc chemistry in atmosphere, Atmospheric Environment, 85, 2014, 83-91.
3. Azevedo, M. Salgueiro; Allely, C.; Ogle, K.; et al.; Corrosion mechanisms of Zn(Mg, Al) coated steel in accelerated tests and natural exposure: 1. The role of electrolyte composition in the nature of corrosion products and relative corrosion rate, Corrosion Science, 90, 2015, 472-481.

**Table S2.** Ba and Bc values for pristine and aged wires in 0.1 M NaCl and 0.1 M Na2SO4.

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| --- | --- | --- | --- |
| **Test solution** | **Wires** | **Ba (V/dec)** | **Bc (V/dec)** |
| 0.1 M NaCl | HDG | 0.027±0.003 | 1.109±0.31 |
| Aged Belgium | 0.018±0.001 | 0.249±0.03 |
| Aged Indonesia | 0.036±0.005 | 0.287±0.12 |
| 0.1 M Na2SO4 | HDG | 0.010±0.001 | 1.091±0.49 |
| Aged Belgium | 0.012±0.001 | 0.238±0.02 |
| Aged Indonesia | 0.025±0.004 | 0.181±0.01 |