

Article

Electrochemical and morphological characterization of Fe-28Mn-6Si-5Cr shape memory steel

C. Mariño *, A. Collazo, X.R. Nóvoa, C. Pérez

Universidade de Vigo, E.T.S.E.I., Lagoas-Marcosende, 9 E-36200, Vigo, Spain
carmen.maria.marino.martinez@uvigo.es

Keywords: electrochemical impedance spectroscopy (EIS), shape memory steel (SMS), corrosion

A new kind of ferrous SMA, of the Mn family and complemented with Cr additions, the Shape Memory Steel (SMS), is being introduced as a very interesting smart material, able to be used in fitting and reshaping applications, and with the potential of being used in structural reinforcement applications. It is also more affordable than Ti and Ni based alloys (NiTiInol) [1].

This research is focused on the corrosion performance of the Fe-28Mn-6Si-5Cr Shape Memory Steel. The sample is immersed in a 0,1 M NaOH + 0,1 KOH solution (pH = 13), that mimics the alkalinity of the concrete pore solution. The passive layer formation while exposed to that medium is studied for 7 days by electrochemical means, and its degradation by Cl⁻ additions is also assessed, by progressive additions of Cl⁻ ions in the previous solution. This aforementioned layer growth and degradation is modeled by an equivalent circuit. The evolution of the system behavior is monitored.

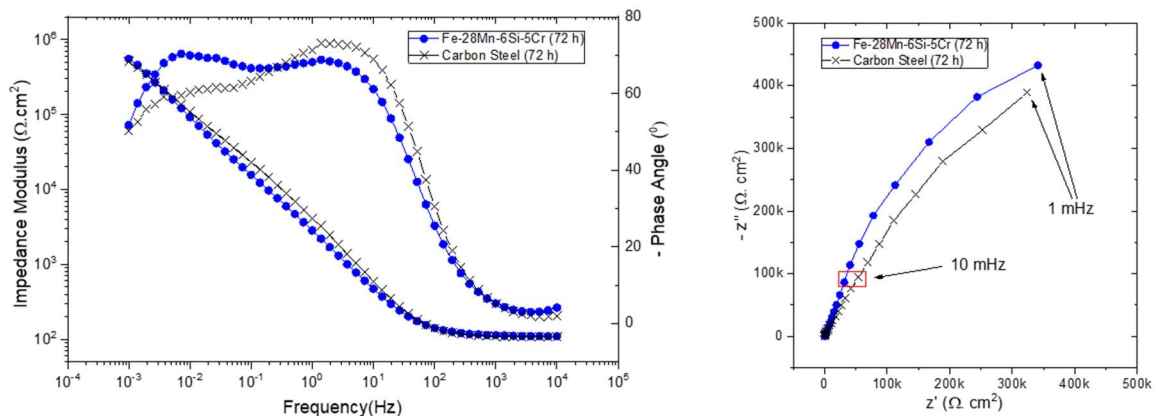


Figure 1. Fe-28Mn-6Si-5Cr (SMS) and carbon steel at 72 hours of immersion time in a 0.1 M NaOH + 0.1 M KOH solution.

Funding: This work has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No769255. This document reflects only the views of the authors. Neither the Innovation and Networks Executive Agency (INEA) nor the European Commission is in any way responsible for any use that may be made of the information it contains.

(1) Zhao, C. *Shape Memory Stainless Steels, Advanced Materials and Processes*, **2001**, Volume 159.