

Abstract

Electrochemical and Morphological Characterization of Fe-28Mn-6Si-5Cr Shape Memory Steel [†]

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In this paper, the Shape Memory Steel (SMS), a new kind of ferrous SMA of the Mn family and complemented with Cr additions, is 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 work is focused on the corrosion performance of the Fe-8Mn-6Si-5Cr Shape Memory Steel. The sample was 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, was studied for 7 days by electrochemical means, and its degradation by Cl⁻ additions was also assessed by progressive additions of Cl⁻ ions in the previous solution. This aforementioned layer growth and degradation was modeled by an equivalent circuit using the EIS data, as seen in Figure 1. The evolution of the system behavior was monitored.



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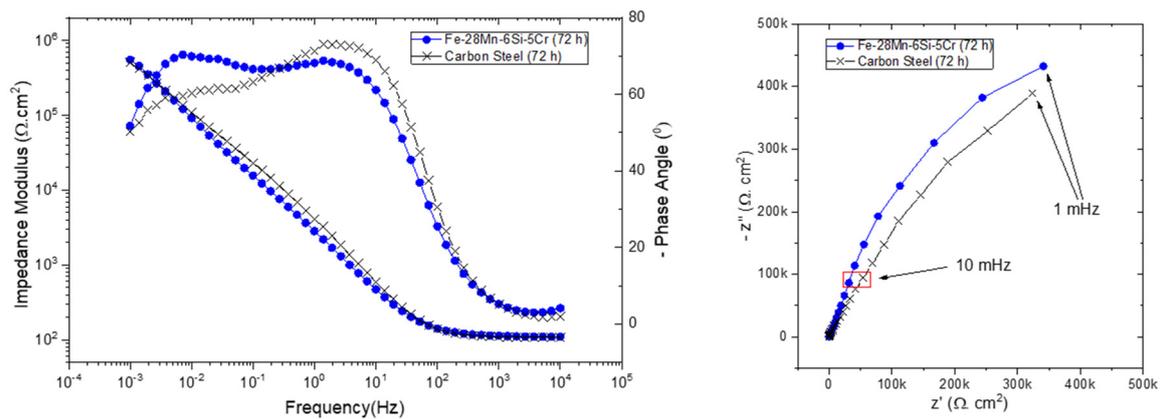


Figure 1. Fe-28Mn-6Si-5Cr (SMS) and carbon steel at 72 h of immersion time in a 0.1 M NaOH + 0.1 M KOH solution.

Supplementary Materials: The conference presentation poster is available at <https://www.mdpi.com/article/10.3390/CMDWC2021-10063/s1>.

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Reference

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