ELECTROCHEMICAL BEHAVIOUR OF La^{3+} OVER Ni AND Mo ELECTRODES IN MOLTEN SALTS CHLORIDE

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Lanthanum - Nickel alloys present high interest because of its capacity to absorb large quantities of hydrogen and the possibility to use these materials as negative electrodes in Nickel – Hydrogen batteries.[1]

The alloys can be prepared directly over nickel substrate by electrodeposition in molten salts, without further thermal treatment.

The electrochemical preparation of $LaNi_5$ films over nickel and molybdenum electrodes, using as electrolyte a mixture of equimolar NaCl-KCl and anhydrous $LaCl_3$ 0.5 M, prepared at ours laboratories, is studied at 700 °C using cyclic voltammetry.

The cyclic voltammogram, obtained by using a nickel wire (1.0 mm diameter) as working electrode, a Ag/AgCl (1.19 M) with Al_2O_3 membrane as reference electrode and a carbon crucible as counter electrode, is shown in fig. 1.

The only one obtained cathodic peak (L), indicates an one step reduction mechanism of three electrons described by the following equation: $La^{3+} + 3e^- \Leftrightarrow La$.

The anodic peaks (1) and (2) are due to the electrochemical dissolution of the intermetallics compounds formed between the reduced lanthanum and Ni electrode. The severals existing intermetallics compounds can be saw in the La-Ni phase diagram[2].

In fig. 2, the peaks L/L' indicate the reduction/oxidation of La^{3+} over Mo wire (1.0 mm diameter), with the same mechanism observed at nickel electrode. The molybdenum electrode doesn't form alloys or intermetallic compounds with the reduced lanthanum.

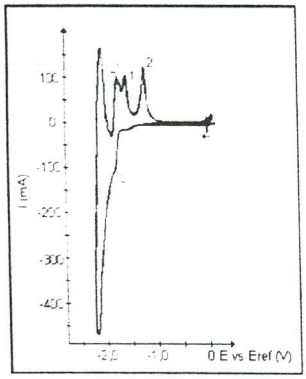

Fig. 1. Cyclic voltammogram at Ni electrode in NaCl-KCl (0.5 M $LaCl_3$), scan rate 20 mV/s.

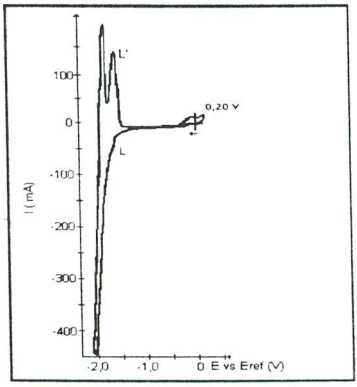

Fig. 2. Cyclic voltammogram at Mo in NaCl-KCl (0.5 M $LaCl_3$), scan rate 20 mV/s.

REFERENCES

1. Willems, J. J. G. and Buschow, K. H. J., **J. Less-Common Metals**, vol. 129, pp.13., 1987.
2. Pan, Y. Y, Nash. P., La-Ni, **Alloy Phase Diagrams**, vol. 6, 1991.