

# Corrosion Study of Current Collectors for Magnesium Batteries

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The transition to renewable energy requires a significant amount of low-cost energy storage systems. Regarding batteries, magnesium provides a highly abundant raw material which is less sensitive to air in comparison to lithium, crucial to the mass production and safety. Promising candidates for intercalation materials on the cathode side are Prussian green  $\text{FeFe}(\text{CN})_6$  with a electrochemical potential of around 0,9 V vs. Mg or the Chevrel phase  $\text{Mo}_6\text{S}_8$  which shows a high specific capacity of around 120 mAh/g.

Magnesium perchlorate-based electrolytes provide a practicable solution for fundamental work in the early stage of cathode research, yet are not compatible with Mg metal due to corrosion. Therefore, the organo-metallic all phenyl complex (APC) based electrolyte is a potential candidate for magnesium full cells. However, both systems contain highly reactive chloride species which cause severe corrosion of the current collector. In this work, potential materials for current collectors (carbon coated Al and Ni) are investigated applying linear sweep voltammetry, chronoamperometry and electrochemical impedance spectroscopy. A graphite based current collector is identified as the most promising candidate due to its high corrosion resistivity of 2 V vs. Mg/ $\text{Mg}^{2+}$  and low areal density, which helps to increase the energy density of practical Mg batteries.

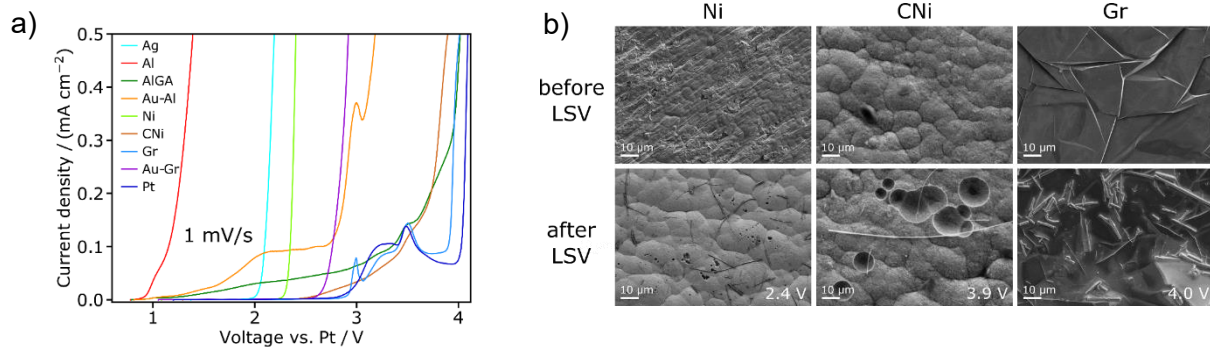


Figure 1 a) LSV measurement of different current collector materials: a carbon coated Al (AIGA) and Ni (CNI) as well as gold coated aluminium (Au-Al) and graphitic foil (Au-Gr); b) SEM comparison of Ni, CNI and Gr before and after LSV measurement.