

The influence of zinc ions on the properties of non-sintered Ni(OH)₂ electrodes

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Non-sintered porous pocket electrodes containing Ni(OH)₂ with addition of Co(OH)₂ and graphite were prepared by pressing into nickel mesh and were measured in four types of electrolytes and with different amount of ZnO concentration. Electrodes were measure in three-electrode setup with large excess of electrolyte.

The electrolytes were:

- 1) 6 M KOH,
- 2) 6 M KOH + 1 M LiOH
- 3) 6 M KOH + 1,8 M KF + 1,8 M K₂CO₃ + 0,8 M LiOH

Each electrolyte was prepared in two modifications with zinc concentration 19 g/l ZnO and in saturated state.

Amount of zinc ion in saturated state were measured by chelatometric titration.

Influence of electrolytes and zinc ion concentration on discharge capacities of both first and second voltage plateau were investigated. For monitoring of diffusion properties of nickel oxyhydroxide electrode (NOE) electrochemical impedance spectroscopy (EIS) in different state of charge [1] after ten galvanostatic cycles was performed.

Table 1: Zinc ion concentration (measured by chelatometric titration) of saturated electrolytes

Electrolyte	Initial concentration		After measurement	
	Zn [g]	ZnO [g]	Zn [g]	ZnO [g]
1	2,93	3,65	2,39	2,98
2	4,51	5,61	3,96	4,93
3	3,19	3,97	2,73	3,40

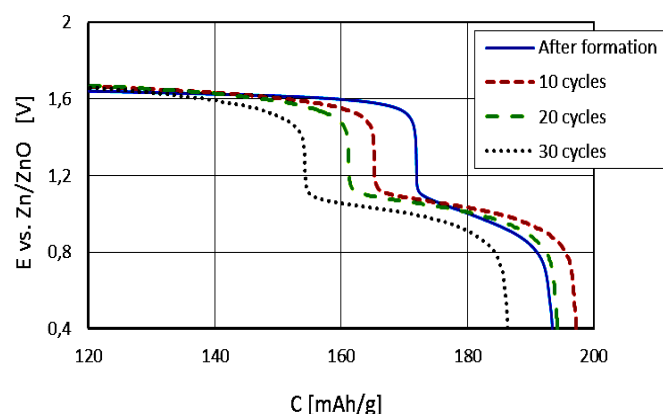


Figure 1: Deep discharge characteristics of NOE in electrolyte 1 saturated by ZnO.

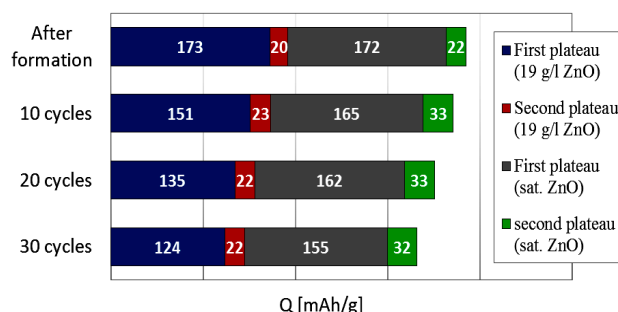


Figure 1: Discharge Ni(OH)₂ electrode capacities of first and second voltage plateau in electrolyte 1 with different zinc ions concentration.

Results suggested that high concentration of zinc leads to significant increase of second voltage plateau capacity. This increase is more significant in electrolyte with LiOH additive, which furthermore suppresses capacity degradation of first voltage plateau. Increase of second voltage plateau isn't observed in the cell with four-component electrolyte. This often recommended electrolyte for Ni-Zn accumulators [3] causes fast capacity degradation of non-sintered Ni(OH)₂ electrodes.

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Literature:

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