Abstract No: 152 ***Physical Sciences***

CYCLIC VOLTAMMETRY STUDY ON ZINC RECHARGEABLE CELLS

H.G.N. Rajapaksha, K.S. Perera* and K.P. Vidanapathirana

Polymer Electronics Research Laboratory, Department of Electronic, Faculty of Applied Sciences, Wayamba University of Sri Lanka, Kuliyapitiya, Sri Lanka
**kumudu31966@gmail.com*

All renewable energy sources require energy storage devices, such as rechargeable cells and super capacitors, due to their fluctuations and continuous unavailability. Zinc (Zn) rechargeable cells have received much attention when compared to lithium (Li) based cells since mainly Zn is safer than Li. This paper is on characterization of a Zn cell with a natural rubber (NR) based electrolyte and a natural graphite (NG) based electrode using cyclic voltammetry. For the preparation of the electrolyte, NR was mixed in tetrahydrofuran (THF). The mixture was stirred using a magnetic stirrer for 24 h. Zinc trifluoromethanesulfonate (ZnTF) solution was prepared separately in THF. NR-ZnTF solutions were then mixed together and stirred further to form a homogenous electrolyte solution. The final solution was then poured into a petri dish and left to slowly evaporate the solvent. This resulted in a thin solid electrolyte film. The cathode consisted of 80% NG and 20% poly (vinylidenefluoride)-co-hexafluoropropylene (PVdF co HFP), whereas Zn was used as the anode. First, the suitable potential window for continuous cycling was determined by varying the potential window width. When widening the window, capacity (C_s) increased, but at the same time, current increased very much for wider windows. The width selected was from 0.4 V to 1.4 V. Continuous cycling was done at the scan rate of 10 mV s^{-1} for 1000 cycles. The C_s values varied from 2.20×10^{-5} mA h to 2.86×10^{-6} mA h during 1000 cycles. Possible reasons for the observed drop of C_s could be the loss of contacts between the electrode/electrolyte interfaces and degradation of the electrolyte. The results obtained provide evidence for the possibility of using NR and NG for zinc cells improving features of safety and low-cost. Further studies are progressing to improve the performance of the cells.

Financial assistance from the National Research Council, Sri Lanka (Grant No. NRC 17-006) is acknowledged.

Keywords: Capacity, Natural rubber, Zn rechargeable cells