Contribution ID: **61** Type: **Poster**

Al3+ ion storage behavior in Polyaniline (emeraldine base) with aqueous electrolyte.

In this report, Polyaniline emeraldine base (PANI-EB) was synthesized by polymerization in ice bath and investigated the electrochemical behavior of Al3+ ion using 1M AlCl3, 0.5 M Al2(SO4)3 and 1M Al(NO3)3 aqueous electrolytes. Reduced graphene oxide (rGO)/PANI-EB and Carbon nanotube (CNT)/PANI-EB composites were also synthesized by in-situ polymerization. The crystallographic characterization was performed by Powder X-ray diffractometer (PXRD), existance of rGO and CNT was verified by Raman analysis. The surface morphology was characterized by SEM analysis. The redox behaviors of pristine PANI-EB, rGO/PANI-EB and CNT/PANI-EB were examined by cyclic voltammetry (CV) and Galvanostatic charge –discharge (GCD) experiments. Cyclic voltammetry (CV) experiments were performed in the potential window (0 - 0.9 V). Pristine PANI-EB delivers initial specific capacities as 103 mAhg-1, 104 mAhg-1 and 54 mAhg-1 at current density 1 Ag-1, which remains 70 mAhg-1, 50 mAhg-1 and 43 mAhg-1 after 100 cycles for the aqueous electrolytes 1 M AlCl3, 0.5 M Al2(SO4)3 and 1 M Al(NO3)3 respectively. Similar behaviors were also observed for the case of rGO/PANI-EB and CNT/PANI-EB. For rGO/PANI-EB, the initial specific capacity was calculated to be 111 mAhg-1, which stand at 64 mAhg-1 and for the case of CNT/PANI-EB, it was 56 mAhg-1, which kept up at 60 mAhg-1 after 100 cycles. The results motivate the approach of PANI based materials for the energy storage devices.

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Session Classification: Technical Session 03

Track Classification: Track 02