Abstract Submitted
for the TSS16 Meeting of
The American Physical Society

Effect of ion size and charge on carbon based electrodes. JUAN ICAZA, RAMESH GUDURU, lamar university — Electrochemical supercapacitors are one of the most reliable power sources with high power density. Among various types, activated carbon based supercapacitors store the charge through formation of double layer of ions at the electrode and electrolyte interfaces. However, the extent of double layer formation and thereby the total charge stored in these capacitors is quite dependent on the ion size as well as charge of the ions. In this research, we investigated the effect of ion size and the ion charge on the capacitance of activated carbon based supercapacitors in two electrode configuration. We employed a commercial microporous activated carbon (pore size <2 nm, area >1000 m^2/g) cloth for these investigations, and the electrolytes were $LiNO_3$, $Mg(NO_3)_2$ and Al(NO3)3. We conducted impedance and cyclic voltammetry measurements. The capacitance values decreased in the following order 1m $Mg(NO_3)_2$>1/3m $Al(NO_3)_3$ ˜1m $Al(NO_3)_3$>0.5m $Mg(NO_3)_2$ ˜1m $LiNO_3$. The electrolyte solution with $Mg(NO_3)_2$ showed the largest capacitance of 240 F/g, while $Al(NO_3)_3$ showed 140 F/g and scan rate employed was 2 mV/s, and further in-depth analysis on ion size and charge effects will be conducted with respect to the type of the electrolytes used and presented.

Juan Icaza
lamar university

Date submitted: 11 Mar 2016 Electronic form version 1.4