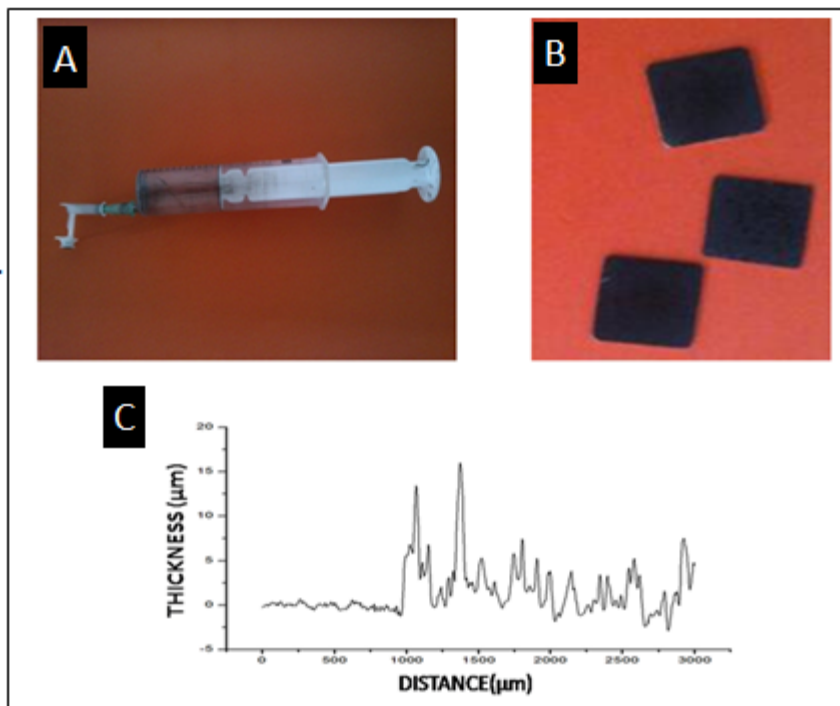


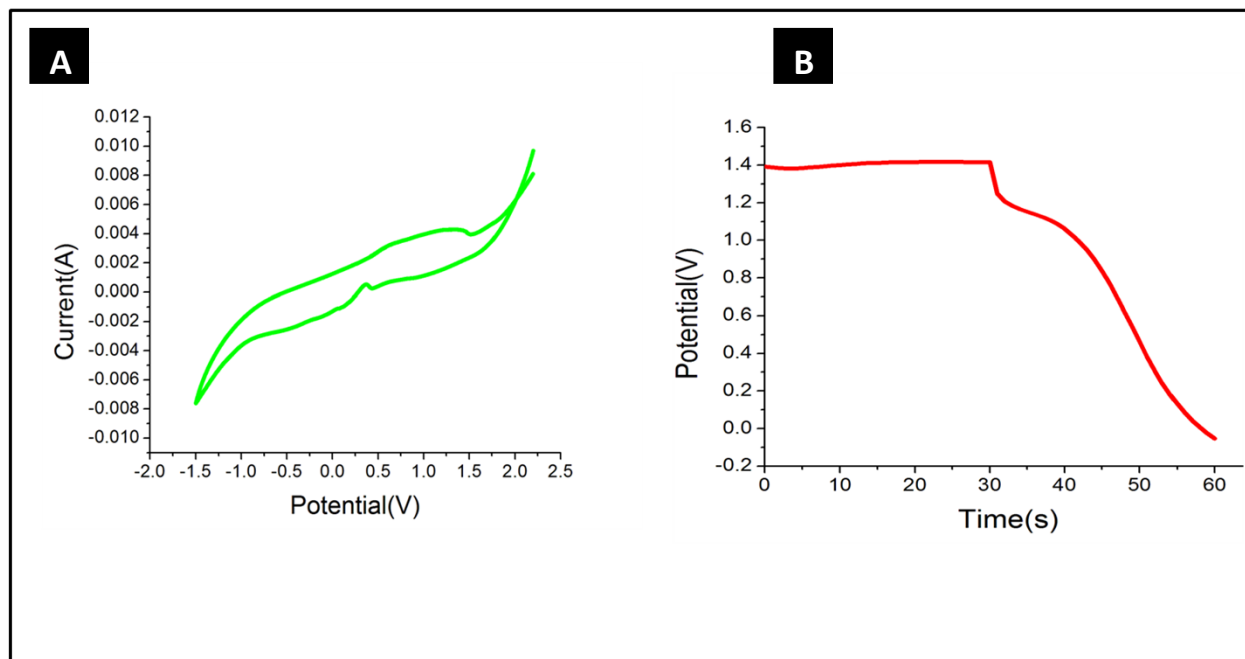
Electronic Supplementary Information (ESI)

Effect of graphene on the performance of an electrochemical flow capacitor†

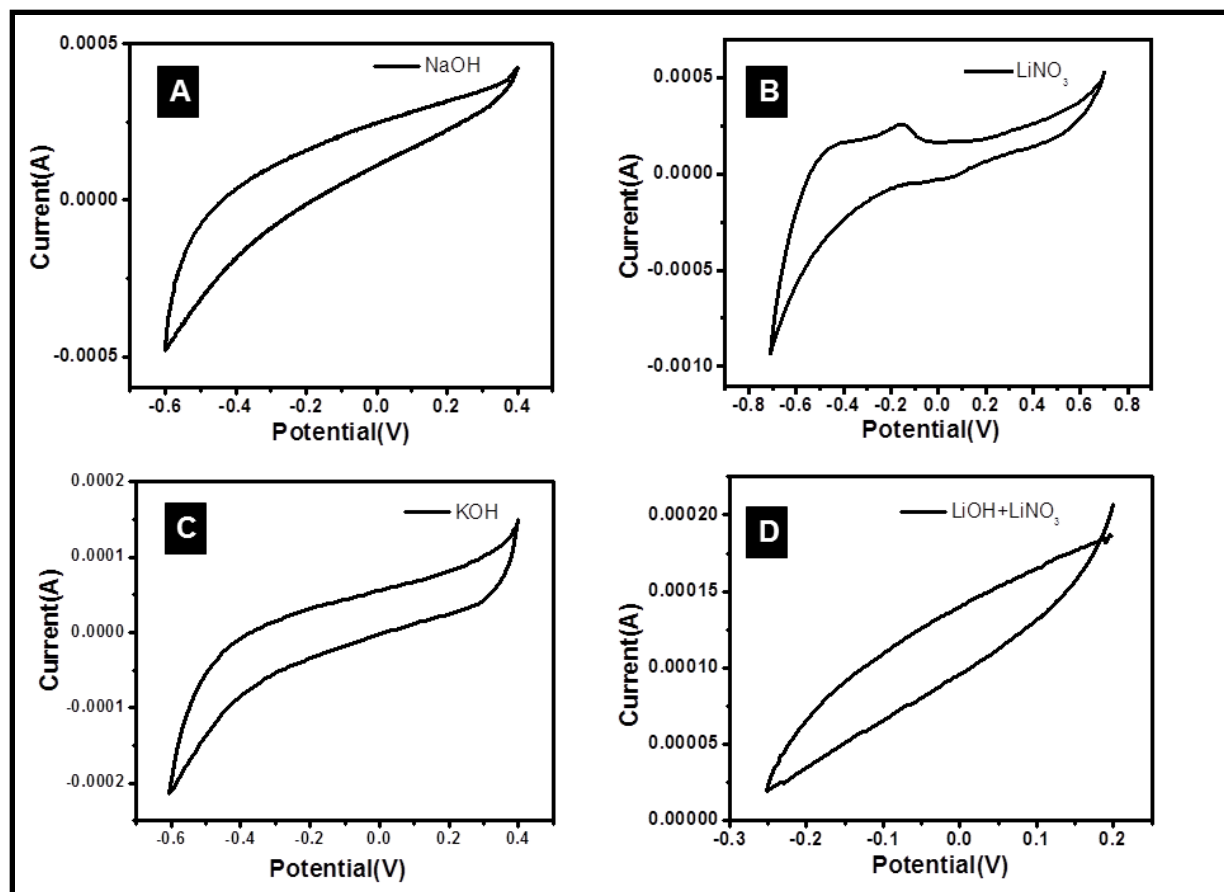
Soorya Sasi, Abhinav Murali, Shantikumar V Nair, A. Sreekumaran Nair,* and K. R. V. Subramanian,*



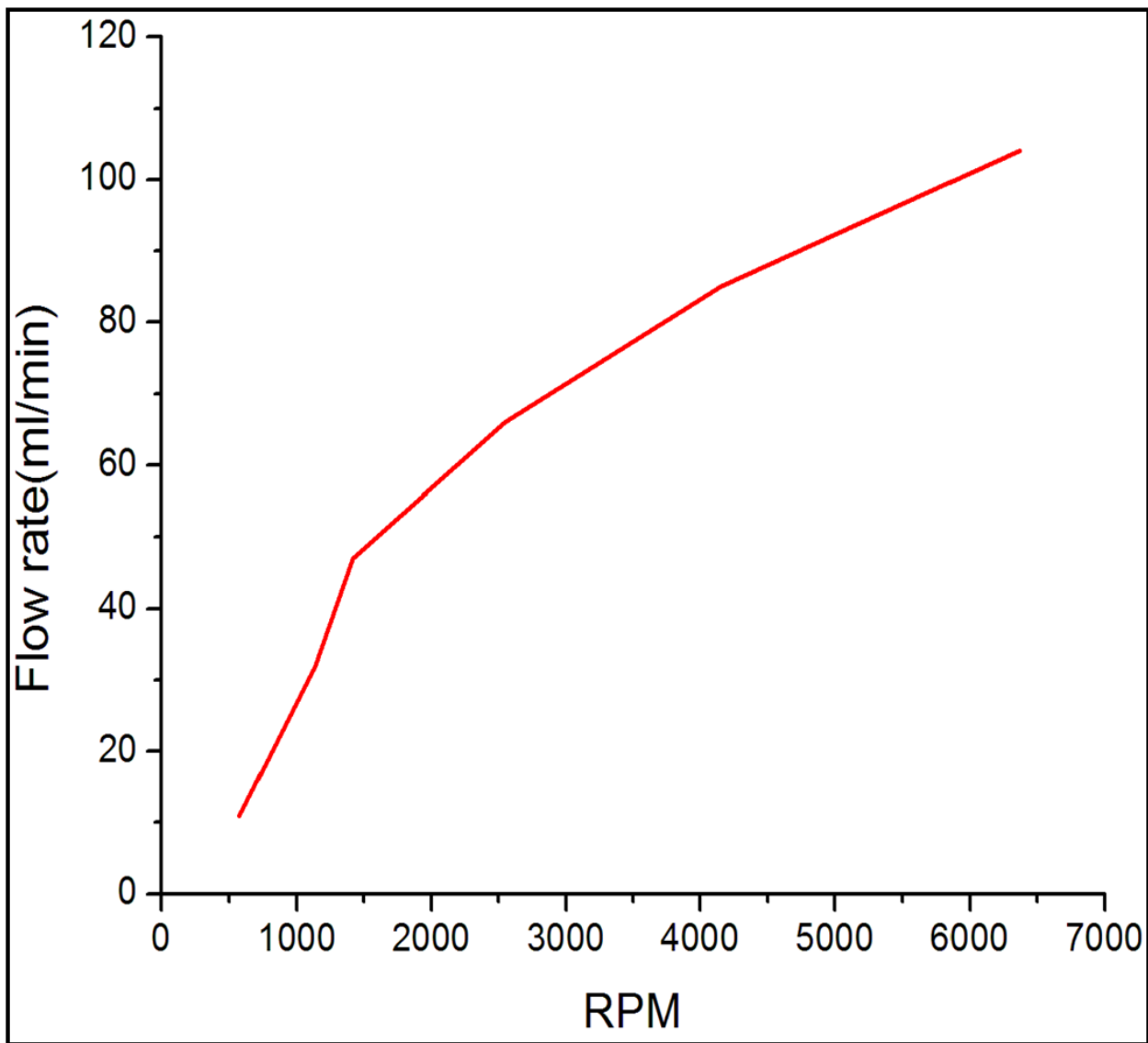
ESI 1. A- Spraying equipment, B- the graphene-coated samples, and C- profilometry of the graphene coated sample showing the thickness of the coatings.



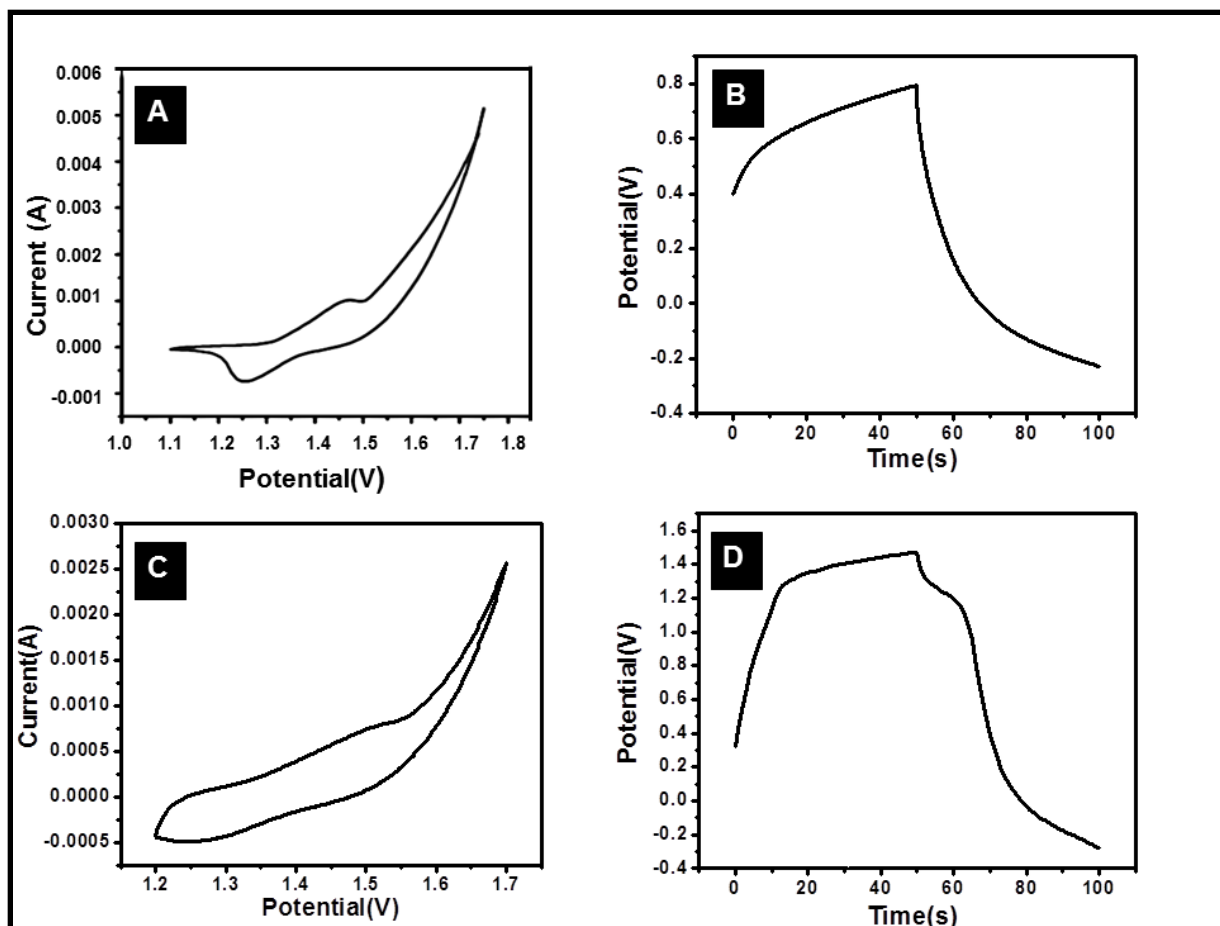
ESI 2: CV (A) and charge- discharge (B) study of the commercial graphene electrode in ionic electrolyte (1-butyl 1-methyl pyrrolidiniumbis(trifluoromethylsulfonyl)imide).



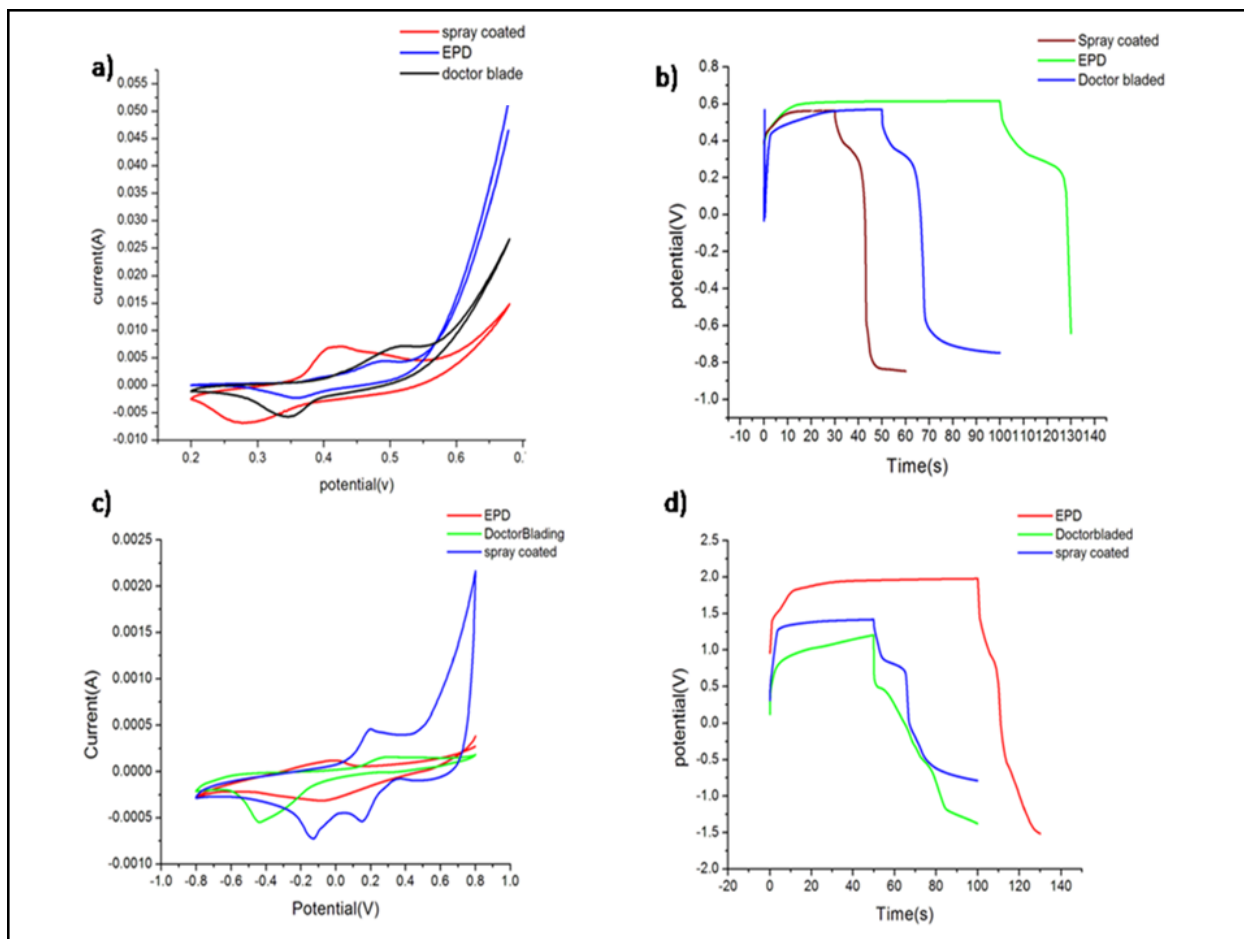
ESI 3: CV study of the graphite electrodes in different electrolytes. a) in NaOH , b) in LiNO₃, c) in KOH, d) in LiNO₃ - LiOH mixture. Graphite was the control. This study was done for optimizing the good electrolyte system for further studies.



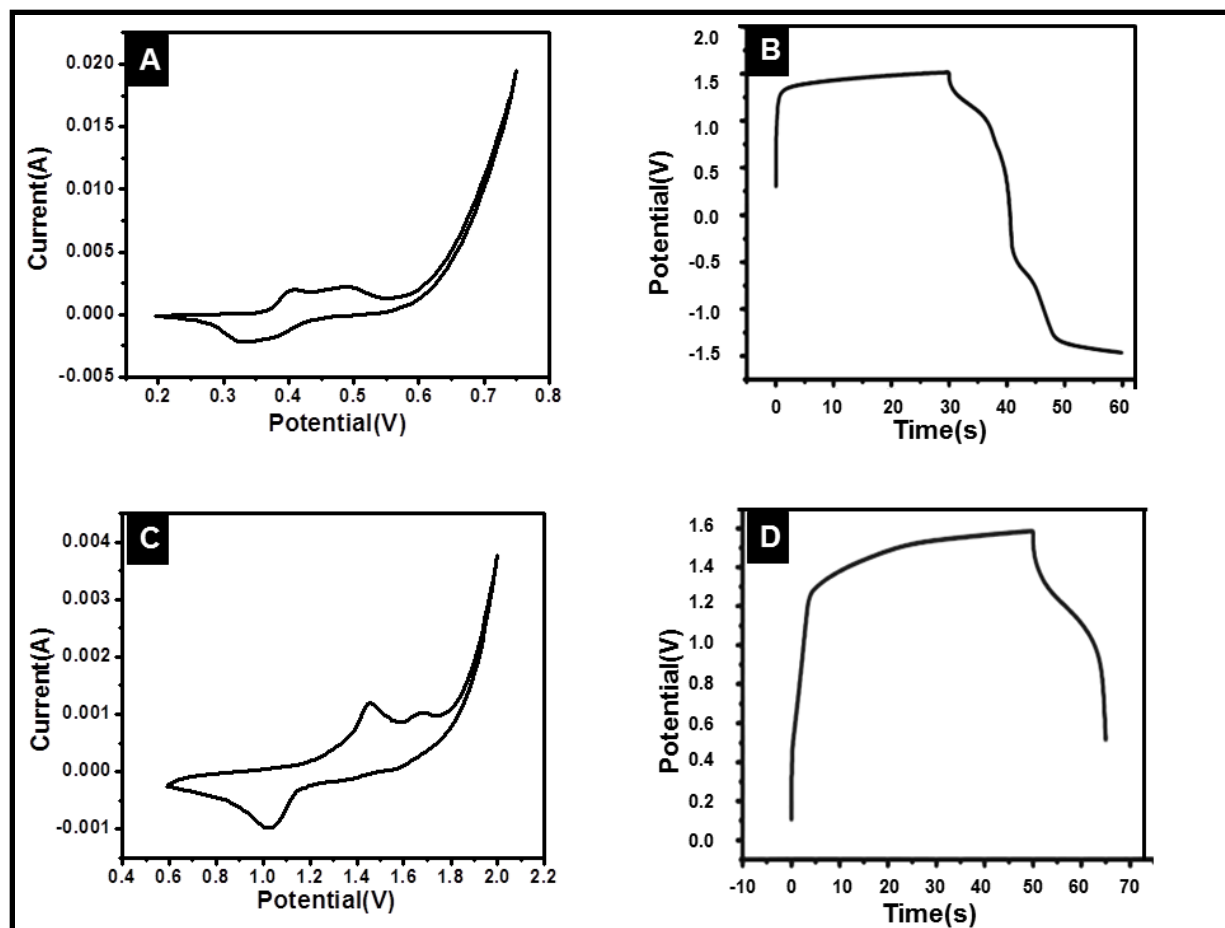
ESI 4. Graph of flow rate variation vs. the RPM of peristaltic pump. When the RPM increased, flow rate has also found to be increased.



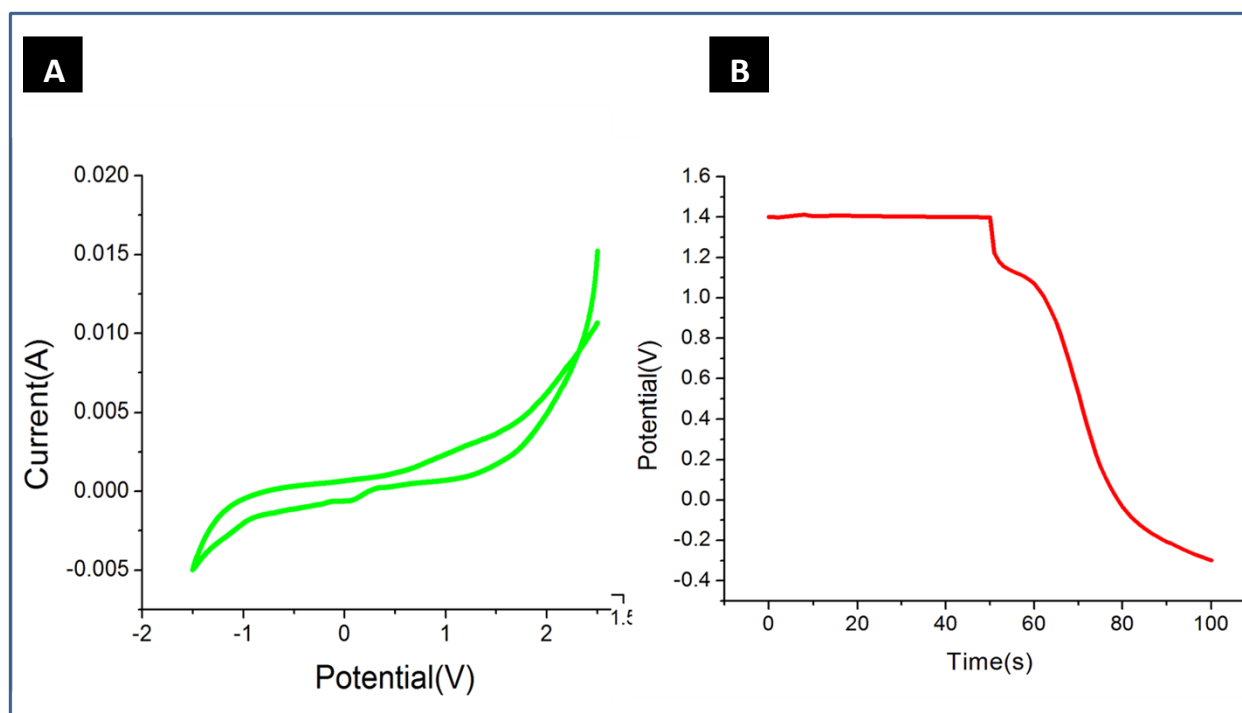
ESI 5: Graphite electrode study in LiOH. a) and b) 3- electrode CV and charge discharge study respectively. c) and d) 2- electrode CV and charge discharge study. LiOH was found to be the best electrolyte among aqueous electrolytes chosen for the study.



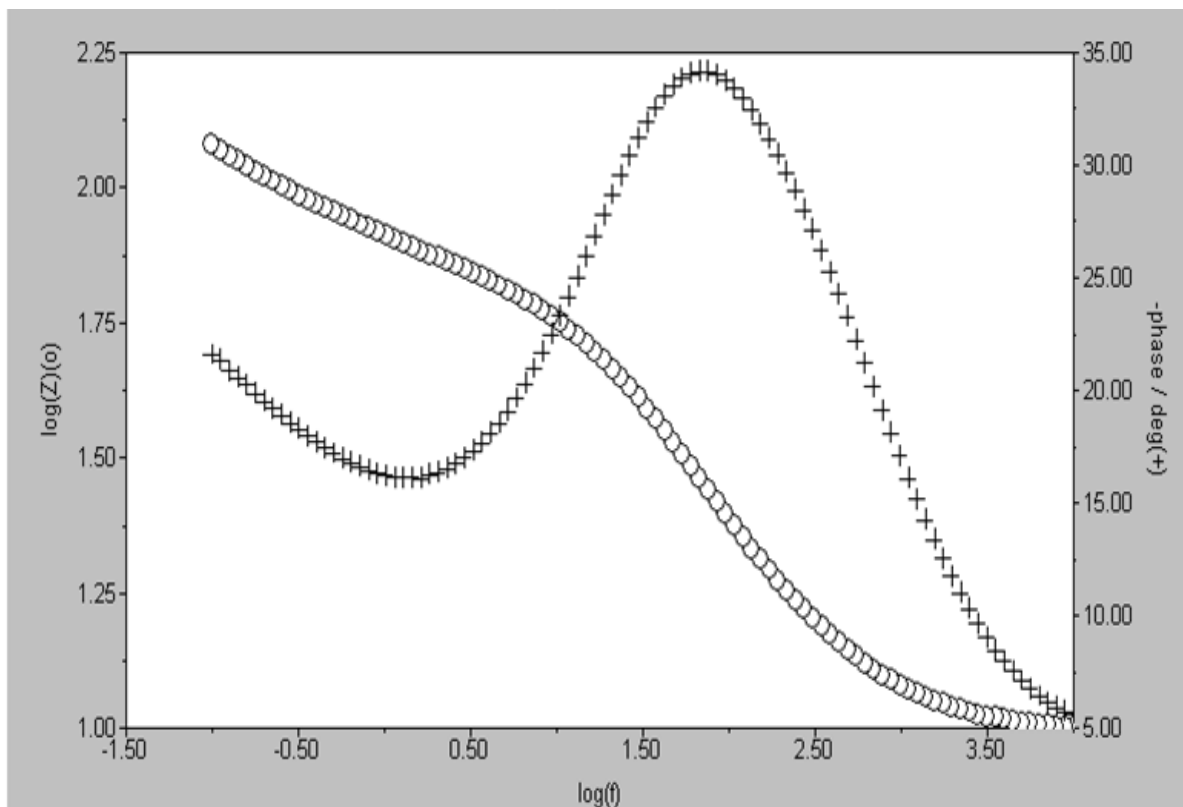
ESI 6: Commercial graphene electrode study in LiOH. a) and b) 3- electrode CV and charge discharge study respectively. c) and d) 2- electrode CV and charge discharge study respectively. LiOH was found to be the best electrolyte among aqueous electrolytes chosen for the study. The graphene coated on the titanium plates to form the electrodes will not show a pure EDLC behavior (*i.e* a rectangular CV response) as they are mixed with oleylamine and sodium lauryl sulphate. The peaks on the CV curve correspond to a slight Faradiac interaction of the amine groups with the LiOH electrolyte which gives rise to redox peaks.



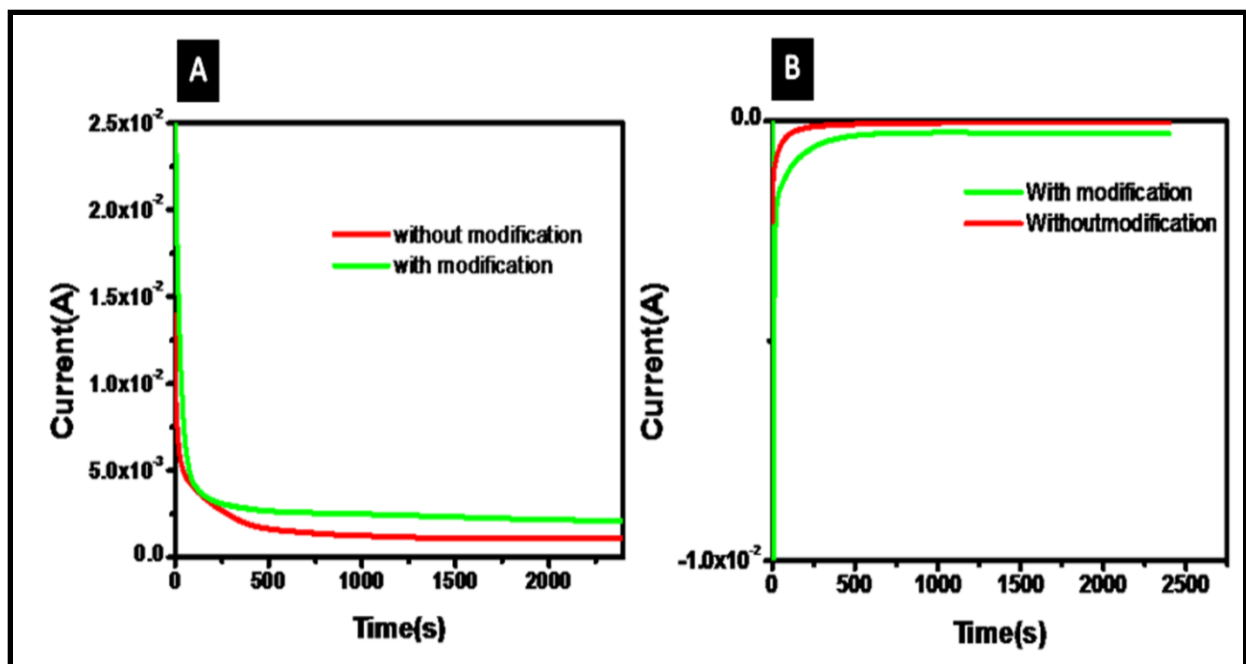
ESI 7: In-house graphene electrode study in LiOH. a) and b) 3- electrode CV and charge discharge study respectively. c) and d) 2- electrode CV and charge discharge study, respectively. LiOH was found to be the best electrolyte amongst aqueous electrolytes chosen for the study. The graphene coated on the titanium plates to form the electrodes did not show a pure EDLC behaviour (*i.e* a rectangular CV response) as they are mixed with oleylamine and sodium lauryl sulphate. The peaks on the CV curve correspond to a slight Faradiac interaction of the amine groups with the LiOH electrolyte which gives rise to redox peaks.



ESI 8: CV (A) and charge -discharge (B) study of the in-house graphene electrodes in ionic electrolyte (1-butyl 1-methyl pyrrolidiniumbis(trifluoromethylsulfonyl)imide).



ESI 9. FRA study (Bode plot) of commercial graphene electrode where the charge transfer resistance is 11.48Ω and the phase angle is 35° .



ESI. 10: Charging (A) and discharging (B) behavior of EFC with and without modification in the current collector. Current collector with modification presents more surface area to the flowing slurry and better charge storage characteristics.