The development of electrochemical energy storage devices offering both high power and energy density is crucial for their several applications, such as providing power to electronic portable devices and electrical vehicles. The energy and power density can be improved by designing materials with chemistry and structures that allows fast faradaic processes, high effective use of the material and high velocity of charge transport. μ-oxo centered trinuclear ruthenium acetate clusters (Ru3O(CH3CO2)6L3) are materials exhibiting several monoelectronic fast redox reactions with tunable redox potential, characteristics that make them attractive to be exploited as electrode material in energy storage.

Whereas, the Langmuir Blodgett (LB) technique is a powerful method to obtain thin films with organized structures, which could exhibit faster charge transport and higher material exposition. So, herein is proposed the fabrication and characterization of thin film electrodes for energy storage devices based on triruthenium acetate clusters. Hybrid nanomaterials combining triruthenium acetate clusters with graphene were synthesized, thin film electrodes were fabricated with drop casting and Langmuir Blodgett technique. The structure and chemical composition of the electrode materials were characterized using SEM imaging, IR, Raman, UV-vis and EDS spectroscopy, whereas their electrochemical behavior was studied using cyclic voltammetry, discharge curves and electrochemical impedance spectroscopy (EIS). Result data demonstrated that the electrodes with ruthenium complexes and the hybrid material were successfully generated. Also, it revealed the contribution of both redox reactions involving the triruthenium cluster and the capacitive process in graphene to the energy storage of the electrode. Besides, LB films revealed high efficiency in the using of the active material and improved charge transport,[9,10] in fact triruthenium cluster LB films can exhibit capacitive behavior despite of the faradaic origin of their charge storage. Finally, it worth to remark that experiments focusing flexible electrode devices with polymeric electrolyte for applications in microelectronics are on the way.