Polyaniline/Graphene Hybrid Material for the Electrochemical Supercapacitors

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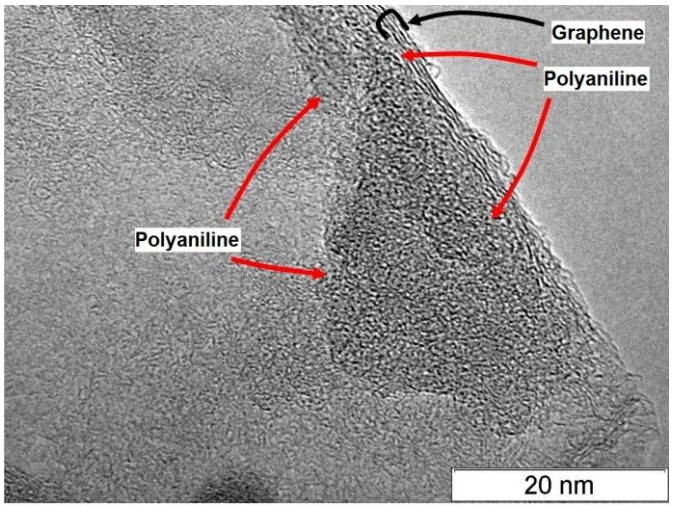
Abstract
Electrochemical capacitors, known as supercapacitors, have attracted great interest as promising energy storage devices due to their high power energy density and long cycle performance than conventional dielectric capacitors. Among various conducting polymer, polyaniline has emerged as the one of the most promising class of active materials for electrochemical capacitor, due to its high capacitive characteristics, easy processing and environmental friendliness. Graphene commonly possess large specific surface area, remarkable chemical inertness and physical stability. Formation of three-dimensional conducting network from graphene coated with a layer of polyaniline, involved in the Faraday processes, seems to be promising for obtaining of high-capacitance supercapacitors. High conductivity of graphene materials provides fast charge/discharge processes and high stability of capacitor. Graphene was synthesized by thermal shock at 800˚C of graphite fluoride. Deposition of polyaniline was carried out by the chemical polycondensation of aniline occurred under an influence of an oxidant in an acidic environment. In our experiments we used sodium persulfate. A study of the graphene and composites structure was carried out by IR spectroscopy. The length and defectness of graphene were determined by Raman spectroscopy and scanning electron microscopy. The electrochemical measurements were carried out on a potentiostat Elins P-30S working in potentiodynamic mode. Electrochemical measurements showed that the capacity of graphene electrode increases with the polyaniline coating formation and depends on amount of polyaniline in the hybrid material.



Picture 1. TEM image polyaniline/graphene hybrid material