Searching for new sources of energy, resulting from increasing pollution and drastically decreasing fossil fuel resources, give new opportunities for alternative electrical engineering solutions. The continuous increase in the fuel consumption results in not only increasing greenhouse gas emissions, but also rising cost of energy production. Therefore, in order to maintain sustainable technological development, it is necessary to reduce the use of natural resources at the same time to invest in development of better solutions to use the energy already produced. Replacing difficult-to-access and increasingly expensive fossil fuels with other inexhaustible and low-cost sources of energy would result in decreasing the greenhouse effect, reducing the dependence on foreign energy sources as well as would bring many other benefits from renewable energy. A huge progress in material engineering evolving towards nanotechnology led to the intensive development of systems such as lithium-ion batteries. The said devices are used in various industries, such as the automotive, the space industry and in a number of types of electronic equipment.

The currently observed intensified research into searching into new electrode materials for use in lithium-ion batteries results in, among others, the need to increase energy density as well as reducing production costs and maintaining good working conditions at the same time. Combining carbon nanotubes with transition metal oxides prolongs the stability of charging/discharging cycles by improving the electrical properties. Despite the huge progress made in the field of using carbon materials in electrochemistry in recent years, the system lifetime is still not satisfactory for practical applications. The synthesis of nanocomposites, combining unique properties of graphene such as fast electron transfer with unique metal oxide properties, opens the way for new research into energy storage systems. Advanced nanocomposite engineering by combining two materials is the most fascinating way to overcome the weaknesses of individual hybrid components as well as to improve their electrochemical properties and potential generation of materials with the properties useful in practical applications that have not been obtained so far.