During past three centuries the energy demand due to the economic growth was fulfilled by burning fossil fuels with simultaneous producing innumerable quantity of pollutants. Right now in the XXI century European and global energy policies are intended to the reduction of CO_2 emissions and development of fossil fuels less dependent, efficient energetics system while maintaining secure energy supplies. Thus, in the near future the increasing part of electricity will come from renewable resources. In this term energy storage is crucial issue enabling modern economy to develop low-carbon and oil independent electricity system. Lithium battery technology is the fastest growing field associated with the energy storage for mobile devices and electric vehicles. It is also becoming the key component of renewable energy storage systems as well as intelligent “smart grid” electricity distribution networks. These factors, however contributed to the very dynamic growth of Li-ion battery market and as a result, to the increase of the price of lithium compounds. Na-ion batteries appear to be much cheaper, future technology of choice. Both, Li-ion and Na-ion batteries exploit the ability of transition metal compounds M_aX_b (M - transition metal, X- O, S) to reversibly intercalate/deintercalate alkali elements. However, sodium compounds are much cheaper and more abounded in the earth’s crust. The basic operational parameters of these batteries depend on electrochemical properties of electrode materials, thus the proposed project is devoted to design key component of the Na-ion battery, which is anode material. During the project, fundamental challenges related to determination and understanding of the critical issues of anodes materials for sodium ion batteries based on MoX_n (X = O, S, n = 2, 3) compounds will be undertaken. Particularly the studies of relation between chemical composition, crystal structure, morphology, surface chemistry engineering, transport and electrochemical properties of molybdenum containing materials MoX_n will be performed. **It is intended that the evolved materials will possess high mixed electronic-ionic conductivity, will be able to reversibly incorporate few moles of Na ions per mol of the compound and exhibit high kinetics of electrochemical reactions. By acquired knowledge it will be possible to establish general rules in designing of MoX_n functional anode materials with unique, required electrochemical properties and as a result obtain Na-ion batteries with enhanced operational parameters.**