

ASPIRE

LOW DIMENSIONAL
NANOMATERIALS FOR
ENERGY STORAGE AND
SENSING APPLICATIONS

INOVATION THROUGH
SYNERGY OF ACTION

Learn more!



Science Fund
of the Republic of Serbia



Project Name: Low-dimension nanomaterials for energy storage and sensing applications: Innovation through synergy of action

Project Acronym: ASPIRE

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The general ability to manipulate matter at an atomic scale has become a holy grail of the material science. This concept has motivated a decades-long research efforts, thanks to which we are getting closer to unlocking many of its possibilities especially in the case of low-dimensional nanomaterials (LDNM). LDNMs have enabled tremendous leap in science and technology that allowed us to tackle both opportunities and challenges of modern society.

The ASPIRE aims to harness unique properties of LDNMs for the beyond the state-of-the-art achievements in energy storage and sensing applications. To be able to do this, ASPIRE will have to overcome current limitations of the selected materials systems. In the case of electrochemical supercapacitors, efforts will be made to scrutinize the electrochemical behavior of various LDNMs to achieve superior control over structure, surface chemistry, conductivity, surface area, materials loading, growth, morphology, self-discharge, etc. In the case of sensors, similar properties play a major role in sensitivity, response/recovery time, repeatability, the limit of detection and operating temperature. Excellent selectivity with long-term stability is still a great challenge.

To tackle these aspects both in supercapacitors and sensors, ASPIRE will use various chemical and physical methods for the synthesis, modification and characterization of LDNMs and their nanocomposites which will enable us to customize interplay between the components at an atomic level through careful control of composition, structure, size, surface chemistry, morphology, etc. As a result, a self-sustained devices based on LDNMs and their nanocomposites will be used for 24/7 monitoring of temperature, humidity and concentration of gases in urban areas in Serbia—all based on the principles of industry 4.0 (smart sensors, IoT, big data, machine learning, AI) thus contributing to our wellbeing (health, environment, economic prosperity, security etc.).

