The modern world is based on **computing technologies**, that are used in almost all areas of our lives (communication, information, transportation, lifestyle, science, finances, etc.). The increasing number of data, processing functions and operations prompts us to constantly search for a new type of functional materials keeping demanded physical and chemical properties. For decades, developing and upgrading inorganic semiconductor materials allowed for the multiplication of computing power every few years. It was possible because of the **miniaturization processes**, so that transistors - the building blocks of computing, could be as densely packed as possible. That trend is commonly known as the **Moore's Law**. Unfortunately, the miniaturization of transistors can't go further because of the quantum tunneling process that restrictive applications of the device. Due to this fact, a new trend arose – so called "**more than Moore** (MtM)". It assumes the preprocessing occurs through **interaction with the environment**, which **saves computing costs**. Some of the functions will be partially taken over by the use of novel material technologies and not by digital ones. If technology based on Moore's Law assumed miniaturization, it can be said that **MtM systems imply diversity** (the same size - more functions). Among the various approaches, the devices exhibiting **resistive switching effect** are a very hot topic of the last two years. In a traditional approach, a capacitive element (semiconductor) is placed between electrodes in a sandwich-type system. By applying electrical pulses of the proper voltage material can be set (being in a high-resistive state) and reset (being in a low-resistive state). Due to the preservation of the states after the turning off of the power source, the resistive switching effect can be used as a building unit for a **novel non-volatile memory**. It can be used to design a new genre of **information storage elements – resistive random access memory** (ReRAM) often referred to as a **memristor**. Generally, the memristor, known also as the "**fourth element in electronics**" should remember the most recent resistance parameters after turn off the electrical power supply. Nowadays there are several trends in the development of new materials for **unconventional computing**. Apart from storage functions, materials exhibiting resistive switching can be used to simulate the behavior of neurons, artificial neural networks or learning mechanism-based devices - neuromorphic computing. Proposed in the project research are focused on developing a new molecular architecture based on **conductive surface-grafted polymer brushe**s that could serve as versatile macromolecular platforms enabling the realization of **resistive switching effect** by **smart redox processes in the nanoscale environment.** Planned to fabricate conductive redox systems based on advanced structures of polymeric brushes obtained in a **controlled surface-initiated polymerization (SIP)** and "**click chemistry**" are promising macromolecular materials with a **resistive switching (memristive**) behavior. The main aspect of the project is focused on materials based on specially designed ferrocene, methyl-ferrocene derivatives incorporated straightway into a directionally conductive chain in a **new concept of ladder-like conducive polymer brushes**, Moreover, the objectives in the project will be realized by the creation of **ordered redox systems** of functionalized (both azide groups and triple bonds) molecules perpendicularly "clicked" to the surfaces. All molecules are able to modulate conductivity parameters with reversible iron oxidation state changes depending on the applied external potential (i. eg. 0.4 V for bare **ferrocene** and up to 0.3 V lower for **methyl-ferrocene**, depending on the number of methyl groups in cyclopentadienyl rings). Tailoring the chemical and physical properties of obtained nanosystems of brushes will allow to study **changes in material shape, modulated conductivity parameters, directional transport of electrons with selective switching or memristive (resistive switching) behavior** in the thin polymeric layers. Due to the versatility of the systems, the effect of various parameters such as geometry, composition (multiblock copolymeric structure, mutual crosslinking), size, grafting density and length of the chains can be studied. Moreover, it is planned to design and fabricate using lithography techniques novel types of electrodes for photoelectrochemical studies.