

Memristors are unique electronic elements: they are classified as passive elements (they can dissipate energy and are not sources of current) and have memory features. These features make the memristors the prospective building blocks for the computers of the future. The existence of memristors was predicted on the basis of electromagnetic theories in the 1970s, but it was only in the 21st century that the first imperfect practical realizations of memristive elements have been reported. Memristors are a great scientific challenge, because they elude the exact mathematical description - there is a significant discrepancy between theory and the observed properties.

Operation of various types of memristors is based on different physical phenomena. The most stable devices with the most reproducible switching patterns are based on metallic filaments. Formation and annihilation of these filaments is responsible for dynamic changes of resistance.

There are two aims of the project: (i) synthesis of new materials capable of silver and copper ion delivery on demand and (ii) development of thin layer memristors based on these compounds. The performance of these devices will be studied with the state-of-the-art spectroscopic techniques, involving the National Synchrotron Radiation Centre SOLARIS (Kraków, Poland).