Centre for Quantum Digital Organic Memristors (CKCOM)

The Institute of Organic Chemistry of the Polish Academy of Sciences is implementing the project **"Centre for Quantum Digital Organic Memristors (CKCOM)"**, co-funded by the **European Union** under the programme **European Funds for Smart Economy 2021–2027 (FENG)**.

The project is implemented under **Priority II: Innovation-friendly environment**, **Measure FENG 2.1: The International Research Agendas Measure (IRAP FENG)**. The **intermediate body for Measure 2.1 FENG is the Foundation for Polish Science (FNP)**.

Beneficiary: Institute of Organic Chemistry, Polish Academy of Sciences

Programme: Priority II of the European Funds for Smart Economy 2021–2027 (FENG)

Measure: Measure 2.1 FENG – International Research Agendas Measure (IRAP FENG)

Project title: Centre for Quantum Digital Organic Memristors (CKCOM)

Project objective: The objective of the project is to develop a new generation of molecular memristors based on proton quantum tunnelling, enabling energy-efficient data storage and processing. The project aims to advance breakthrough technologies for nanoelectronics, neuromorphic computing, and future applications in artificial intelligence and edge computing.

Project description: The "Centre for Quantum Digital Organic Memristors (CKCOM)" project is carried out by **five cooperating research teams**, whose activities cover successive stages in the development of molecular memristors – from the design and synthesis of organic compounds, through modelling and physicochemical characterisation of materials, to the testing of memory structures. The teams operate in a complementary manner, integrating expertise in chemistry, materials science, and nanoelectronics. This project structure enables effective integration of fundamental research with development activities and strengthens international cooperation and knowledge transfer to industry. As a result, the project will lead to the development of innovative molecular memory technologies with high implementation potential.

Scope and activities

The following activities will be carried out within the project:

- conducting research and development work on new molecular systems,
- design and synthesis of functional organic compounds,
- theoretical modelling and physicochemical characterisation of materials,
- purchase and use of advanced research equipment,
- testing and validation of prototype memristors,
- development of research staff and international cooperation with research centres and industry.

Target groups

The project is addressed to the scientific community, in particular researchers, PhD candidates, and early-career scientists, as well as to the high-tech sector, including companies operating in nanoelectronics, artificial intelligence, and advanced computing technologies.

Project outcomes and results

The outcomes of the project will include:

- development of innovative molecular memory technologies,
- scientific publications in leading international journals,
- patent applications with implementation potential,
- development of research infrastructure and scientific competences,
- strengthening cooperation between science and industry.

Financing: The project is co-financed by the European Union under the programme European Funds for Smart Economy 2021–2027 (FENG).

Total project value: PLN 29,984,500.00

European Funds contribution: PLN 29,984,500.00

Project implementation period: 1 January 2026 – 31 December 2029

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