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PROJECT DETAILS:

Start date: 01 May 2023

Duration: 36 Months

Grant Agreement: 101099125).

EU Contribution: € 2 975 Million

Funded by the European Union

This project has received funding from the Pathfinder Open under the European Union's Horizon EU research and innovation programme (Gra agreement No. 101099125).

3D Biofabricated high-performance dna-carbon nanotube dIgital electronicks

www.3d-bricks.eu

3D BRICK PROJECT

OVERVIEW

3D-BRICKS will provide a novel platform for the next-generation of electronic nanodevices (logics, digital circuits and memories). Hybrid DNA-nanostructures/carbon nanotubes (CNTs) will be developed for the realization of three-dimensional (3D) stacked transistors at high density, combined with a new series of designs for reproducing all the fundamental logic ports that will be fast, reliable and easily interconnected via planar (2D) and 3D configurations. Moreover, the same approach will be used to implement storage circuits (non-volatile memory) based on CNTs. The development of hybrid DNA/CNTs systems will be a paradigm change for nanoelectronics and computing, areas in which the current demand of new devices is rapidly outpacing the capabilities offered by semiconductor technologies.

OBJECTIVES

The project will enable the definition, fabrication and test of a new set of nanoelectronic circuits which application can be extended not only to FETs and non-volatile memories, but in general to multiple fields (neuromorphing computing, nano-sensors, etc.). We will develop self-assembled bottom-up DNA platforms for hybrid functional devices that combine different species such as CNTs and metallic nanomaterials to form logic circuits and is readily scalable to 3D geometries.

PARTNERS

The 3D-BRICKS consortium was specifically assembled to unite the largely cross-disciplinary expertise that is crucial for the ambitious objectives on 3D CNT nanoelectronics, and to implement the developed technology in industry. The Prof. G. Acuna group at Friburg will provide the DNA nanotechnology pushing the design and synthesis towards 3D. The collaboration between Friburg and R. Seidel (University of Leipzig) will provide new DNA designs and methods to arrange nanomaterials, both CNTs and metals to the 3D DNA template. The already demonstrated strong collaboration between B. Flavel (KIT) and S. Cambré (Antwerp) will be the key for the development of engineered CNTs. Prof. R. Wiesendanger (Hamburg) and C. Sotomayor Torres (ICN2) will provide methods and tools for the hybrid DNA - 3D CNT nanostructures characterization and deep physical mechanism comprehension. R. Proietti Zaccaria and D. Garoli (IIT) contribute with the nanofabrication of the arrays and the electrical readout devices.

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