

3D Bricks Project

Newsletter

2025- Issue 1

Overview of the Project

The **3D Bricks** – *3D Biofabricated high-performance dna-carbon nanotube digital electroniCKS* is a 36-month project, which started in May 2023 (project number 101099125).

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.

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 consortium is led by the Italian Institute of Technology (IIT) with the participation of 10 partners



News

3D Bricks Project, New partner

Thanks to the Pathfinder Hop-On project “3D-BRICKSDrop,” Taltech, located in Tallinn, Estonia, has joined the consortium as a new partner. Its primary responsibility will be to develop and demonstrate the application of micro and nanofluidics in the creation of DNA origami combined with nanomaterials systems. To achieve

this, Taltech will collaborate closely with the University of Fribourg and the University of Leipzig on the design and synthesis of DNA nanostructures. Additionally, it will work alongside other consortium members to characterize the hybrid DNA and carbon nanotube (CNT) structures.

3D Bricks Project, Partners' Publications

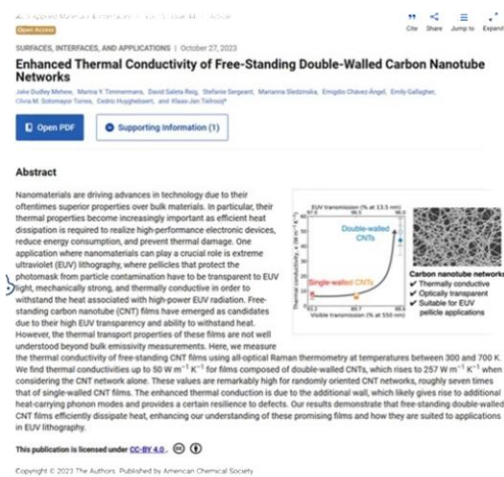
Several peer-reviewed articles authored by 3D Bricks partners have been published in reputable scientific journals. You can explore these contributions by visiting the “[Publications](#)” section on the project website.



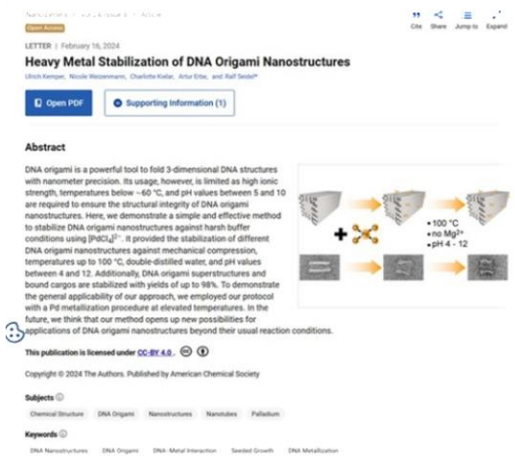
Article: “*Modular Plasmonic Nanopore for Opto-Thermal Gating*” (Author(s): Ali Douaki, Shukun Weng, German Lanzavecchia, Anastasiia Sapunova, Annina Stuber, Gabriele Nanni, Nako Nakatsuka, Makusu Tsutsui, Kazumichi Yokota, Roman Krahne, Denis Garoli). This article has been published in: **Advanced Optical Materials**, 2024, ISSN 2195-1071 (Publisher: Wiley, DOI: 10.1002/adom.202402189). You can read this article at [this link](#).



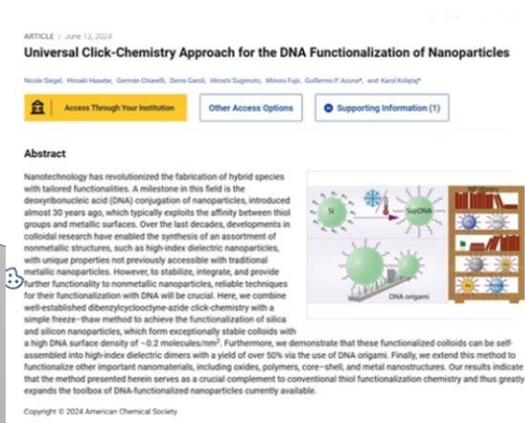
Article: “*Dry synthesis of bi-layer nanoporous metal films as plasmonic metamaterial*” (Author(s): Vincenzo Caligiuri; Hyunah Kwon; Andrea Griesi; Yurii P. Ivanov; Andrea Schirato; Alessandro Alabastri; Massimo Cuscunà; Gianluca Balestra; Antonio De Luca; Tlek Tapani; Haifeng Lin; Nicolò Maccaferri; Roman Krahne; Giorgio Divitini; Peer Fischer; Denis Garoli). This article has been published in: **Nanophotonics**, 2024, Volume 13 Issue 7. You can read this article at [this link](#).



Article: “Enhanced Thermal Conductivity of Free-Standing Double-Walled Carbon Nanotube Networks” (Author(s): Jake Dudley Mehew; Marina Y. Timmermans; David Saleta Reig; Stefanie Sergeant; Marianna Sledzinska; Emigdio Chávez-Ángel; Emily Gallagher; Clivia M. Sotomayor Torres; Cedric Huyghebaert; Klaas-Jan Tielrooij. This article has been published in: **Applied Materials and Interface**, October 27, 2023, Vol 15, Issue 44. You can read this article at [this link](#).



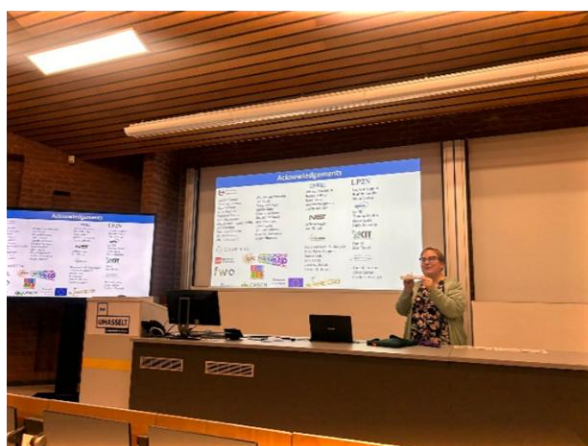
Article: “Heavy Metal Stabilization of DNA Origami Nanostructures” (Author(s): Ulrich Kemper, Nicole Weizenmann, Charlotte Kielar, Artur Erbe, Ralf Seidel. This article has been published in: **Applied Materials and Interface**, February 16, 2024, Vol 24, Issue 8. You can read this article at [this link](#).



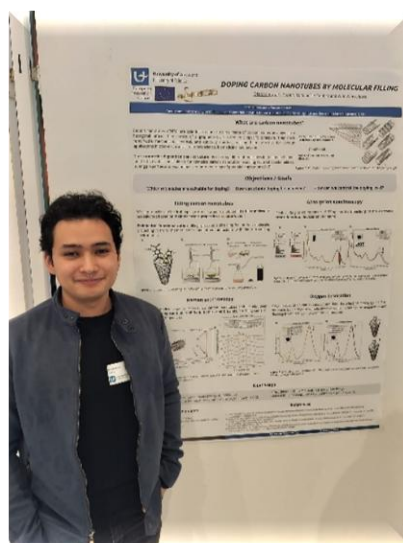
Article: “Universal Click-Chemistry Approach for the DNA Functionalization of Nanoparticles” (Author(s): Nicole Siegel, Hiroaki Hasebe, Germán Chiarelli, Denis Garoli, Hiroshi Sugimoto, Minoru Fujii, Guillermo P. Acuna, Karol Kořatj. This article has been published in: **Journal of the American Chemical Society**, June 13, 2024, Vol 146, Issue 25. You can read this article at [this link](#).

Dissemination activities carried out by 3D Brick Partners

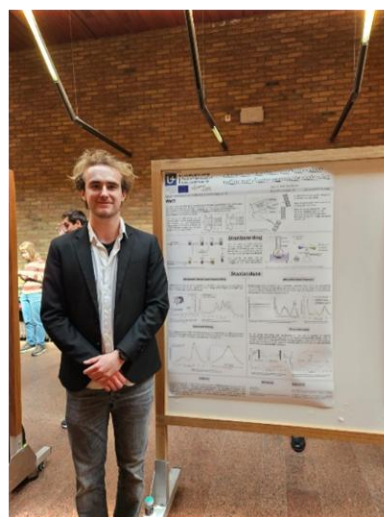
The **University of Antwerp**, a 3D Bricks partner, has been particularly active during this period—organising and participating in multiple events to promote the project. On 4 December 2024, **Prof. Sofie Cambré** delivered a one-hour overview lecture at the **University of Hasselt**, highlighting ongoing research within her group. The presentation included selected findings from the **3D Bricks** project, offering valuable insights into its progress and impact.

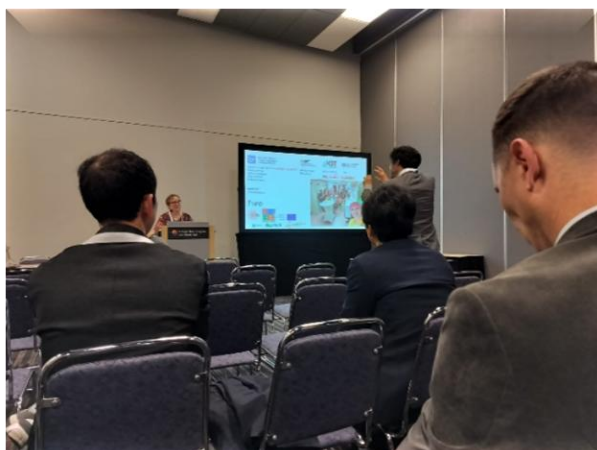


In February, **Cristian Borja** presented a poster titled “*Doping Carbon Nanotubes by Molecular Filling*” at **Faculty Research Day 2025**. His work explored innovative strategies for enhancing the properties of carbon nanotubes through molecular-level modifications. The presentation drew interest from attendees across disciplines, highlighting the relevance of nanomaterials research in advancing next-generation technologies.



In **May 2025**, **Kobe van Daele**, a bachelor’s student at the **University of Antwerp**, showcased his contribution to the 3D Bricks project during the university’s **thesis poster session**. His presentation highlighted the innovative work being carried out at the student level within the project. Meanwhile, **Prof. Wim Wenseleers** and **Prof. Sofie Cambré** represented the University of Antwerp at the **247th ECS Meeting in Montreal, Canada**, where both delivered invited talks.





also welcomed several other **3D Bricks** collaborators, sparking vibrant discussions and fostering new connections across the global research community. **Timm Swoboda** and **Marianna Sledzinska** from the **Institut Català de Nanociència i Nanotecnologia (3D Bricks Partner)**, presented a poster at this event.



In June 2025, **Prof. Sofie Cambré** was invited to speak at **NT25**, the prestigious international nanotechnology conference held in Kyoto, Japan. Her talk, featured in the main session, focused on the use of magnetic resonance techniques to investigate functionalized carbon nanotubes—a core aspect of the 3D Bricks project. The conference



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