

Prof. Denis Garoli

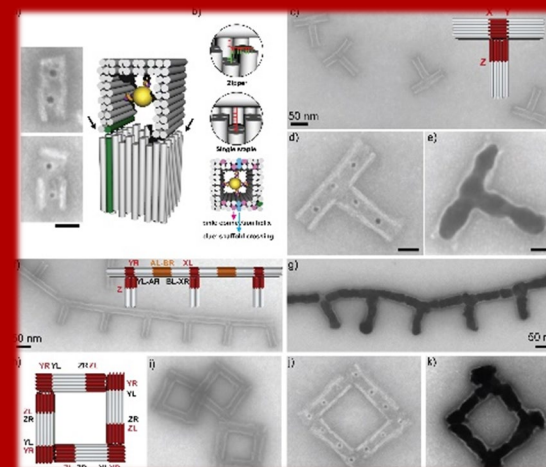
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DNA Nanotechnology: application in single molecule studies and nanodevices

Monday 30th June 2025 at 14:30
Room I - DiSC

DNA nanotechnology harnesses the molecular recognition and self-assembly properties of nucleic acids to construct nanoscale structures and devices with high precision. This field has evolved beyond structural design to enable functional applications in biophysics, nanomedicine, and molecular engineering. In single molecule studies, DNA-based constructs serve as customizable scaffolds for organizing biomolecules, facilitating real-time observation of dynamic interactions at the nanoscale with unprecedented resolution.

Techniques such as DNA origami provide platforms for spatially resolving molecular mechanisms and force measurements using tools like optical tweezers and fluorescence resonance energy transfer (FRET). Concurrently, DNA nanodevices—including switches, motors, and sensors—demonstrate programmable behavior, offering promising avenues for targeted drug delivery, biosensing, and synthetic biology. The combination of DNA nanotechnology and nanomaterials science has huge potential in enabling unprecedented effects at the nanoscale, in particular in single molecule analysis and nanodevice fabrication.



For selected references, see:

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- N. Siegel, H. Hasebe, G. Chiarelli, D. Garoli, H. Sugimoto, M. Fujii, G. P. Acuna, K. Kolataj, "Universal click-chemistry approach for the DNA functionalization of various nanoparticles", J. Am. Chem. Soc. 2024, 146, 25, 17250–17260.
- A. Douaki, S. Weng, G. Lanzavecchia, A. Sapunova, A. Stuber, G. Nanni, N. Nakatsuka, M. Tsutsui, K. Yokota, R. Krahne, D. Garoli*, "Modular plasmonic nanopore for opto-thermal gating", Adv. Opt. Mat. 2025, 13, 2402189.
- A. Douaki, A. Stuber, D. Buckingham, D. Momotenko, N. Nakatsuka, and D. Garoli*, "Theoretical Analysis of Divalent Cation Effects on Aptamer Recognition of Neurotransmitter Targets", Chem. Comm. 2023, 59, 14713 – 14716.
- Q. Ma, M. Chinappi, A. Douaki, Y. Zou, H. Jin, E. Descrovi, R. Krahne, R. Proietti Zaccaria, R. Marotta, W. Wang, D. Cojoc, K. Kolataj, G. Acuna, S. Jin and D. Garoli, "Dynamics of Ultrafine Silver implanted DNA nanowires Formation", Nanoscale 2025, <https://doi.org/10.1039/D5NR00934K>

La presenza della S. V. sarà molto gradita.

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