RESEARCH FUTURE NANOMANUFACTURING

CNST Center for Nanoscale Science & Technology

Nanoscale Manufacturing Using DNA Origami

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GOAL

To develop measurement methods to understand the factors that determine the potential of DNA origami templates for self-assembly of nanostructures, including speed, yield, and precision.

KEY ACCOMPLISHMENTS

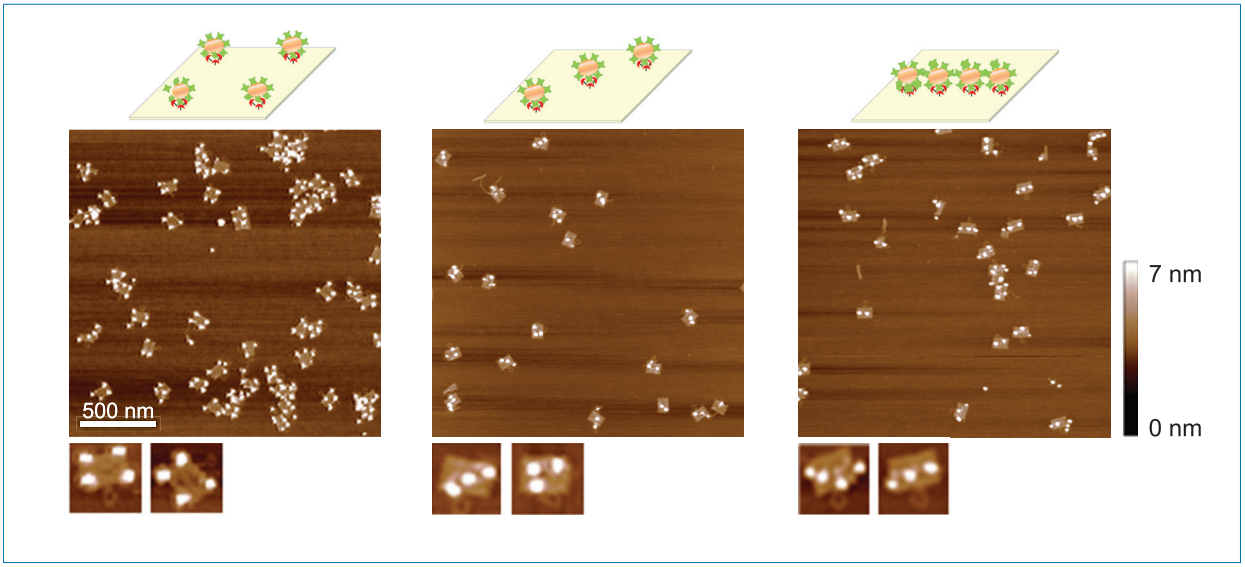
Determined the rate constants for attaching functionalized quantum dots to DNA origami and identified factors that can improve the attachment yield.

Demonstrated that while DNA origami templates are promising for biological applications such as sensing and drug delivery, the placement precision is too low and the error rate is too high for semiconductor device manufacturing.

NEW MEASUREMENT CAPABILITY

A new measurement technique that allows accurate measurement of the reaction rates and yields for attaching nanostructures to DNA origami.

The researchers found that putting the quantum dots closer together caused them to interfere with one another, leading to higher error rates and lower binding probabilities. As shown in these three atomic force microscope topographic images, DNA origami templates were designed so that the quantum dots would self-assemble: in the corners (left), diagonally (middle), and in a line (right).



REFERENCE

Nanomanufacturing with DNA origami: factors affecting the kinetics and yield of quantum dot binding, S. H. Ko, G. M. Gallatin, and J. A. Liddle, *Advanced Functional Materials* **22**, 1015–1023 (2012).