

Rationalizing Nano-Assembly: From Structural Diversity to Designed Materials

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ABSTRACT

In the last decades nanoscale objects emerged as a novel type of matter with unique functional properties due to their finite sizes. In parallel, synthetic methods for fabrication of such nano-objects with different compositions, sizes and shapes have been developed. These advancements call for the new strategies to organize multi-component nanoscale systems in space and time. Incorporation of biomolecules into a nano-object design provides a unique opportunity to establish highly selective and reversible interactions between multiple types of components. Such encoding of interactions opens exciting possibilities to control formation and transformation of nanoscale structures. I will discuss these approaches in the context of DNA-programmable assembly, in which the high degree of addressability of nucleic acids is used to guide the formation of structures from nanoscale synthetic components. Our work explores how DNA can direct inorganic nano-components into well-defined superlattices and clusters, how the morphology of self-organized structures can be regulated, and what molecular factors govern a system formation. Our progress on the assembly of structures with designed symmetries, realizations of switchable and tunable superlattices, and the relevance of this strategy for nano-optical application will be discussed. This research is supported by the U.S. DOE under contract No. DE-AC-02-98CH10886.

BIOGRAPHY

Dr. Oleg Gang is a Scientist at the Center for Functional Nanomaterials (CFN) at Brookhaven National Laboratory in Upton, NY. At CFN he is the Leader for the Soft Matter and Bio-Nanomaterials Theme, where he has developed the scope, goals and activities of the Soft-Bio Theme. Dr. Gang earned an M.Sc in Physics and a Ph.D. in Soft Matter Physics from Bar-Ilan University in Israel in 1994 and 2000, respectively. From 2000-02 he was a Postdoctoral Rothschild Fellow at Harvard. His research work has been recognized with the BNL Science and Technology Award for Outstanding Achievement (2011), the Gordon Battelle Prize for Scientific Discovery (2010), and the US DOE Outstanding Mentor Award (2009). Dr. Gang has given over 70 invited, keynote and plenary talks and has 80+ publications in the areas of soft matter on nanoscales and at the interfaces; programmable assembly of nanoscale systems; structure of macromolecules and polymers; optical and biomedical applications of nanomaterials; and synchrotron methods for soft matter.



EVENT DETAILS

DATE:

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TIME:

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LOCATION:

Babbio 122
Stevens Institute of
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ATTENDANCE:

Public

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