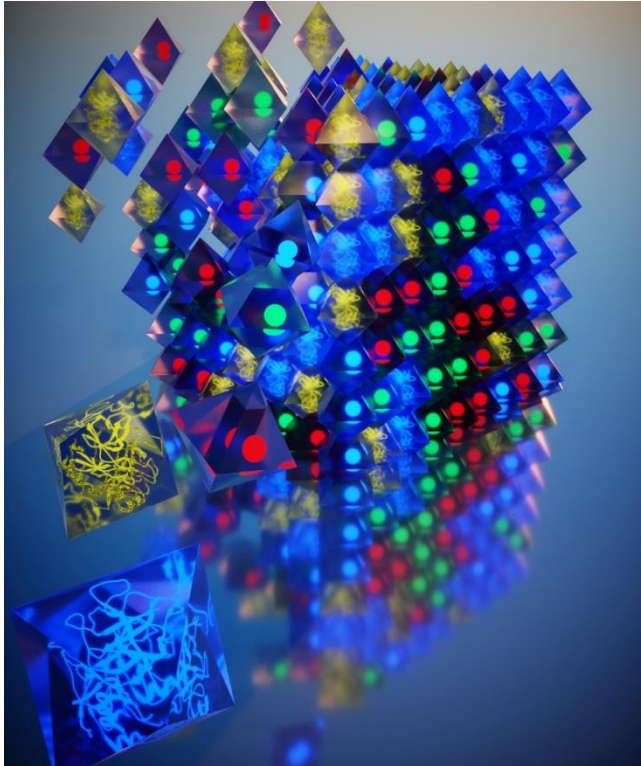


3D Nanomaterials Assembly via Material Voxels



The schematic depicts the spatial different reaction products after the electrochemical reaction, clearly revealing that the even distribution of the products, and the electrolyte is not uniform in the cell.

Scientific Achievement

The new approach offers a rational assembly of nano-objects into ordered 3D arrays.

Significance and Impact

Self-assembly is an attractive method for building nano-systems for catalytic, optical and energy materials, but creating the targeted 3D ordered nanomaterials is challenging. The developed platform offers assembly of nanomaterials via “material voxels.”

Research Details

- Assembled & integrated 3D DNA frames with nanoparticles and proteins to form material voxels.
- Computationally rationalized & experimentally assembled different types of 3D ordered lattices.
- Revealed the relationship between material voxel designs and formed structures through *in situ* x-ray scattering at the CHX and CMS beamlines at NSLS-II & *ex situ* electron microscopy at the CFN.
- Created novel optical and catalytic nanomaterials.

Y. Tian, J. R. Lhermitte, L. Bai, T. Vo, H. L. Xin, H. Li, R. Li, M. Fukuto, K. G. Yager, J. S. Kahn, Y. Xiong, B. Minevich, S. K. Kumar, O. Gang, L. *Nat. Mater.* **19**, 789–796 (2020).

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