Engineering Molecular Tools with DNA Nanotechnology

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Cells are self-assembled machineries



Top-down: extract, disturb, probe...

Bottom-up: build, recapitulate 🖛

Engineering challenge

Control geometry, stoichiometry, and dynamics of molecular assemblies

Quantitative biology

Imaging standards and probes for quantitative microscopy
Biomimetic constructs to analyze molecular interactions

Engineer 3D shapes with DNA





Shih and Lin, Curr. Opin. Struct. Biol. (2010)

Biomimetic DNA nanostructures



ChengY et al. *JMB* (2007); Marks B et al. *Nature* (2001); Lata S et al. *Science* (2008); Grahams B. <u>Wikipedia</u>; YangY (unpublished); Grome MW (unpublished); Zhang Z (unpublished); Langecker M et al. *Science* (2012)

DNA-scaffolded membrane curvatures



