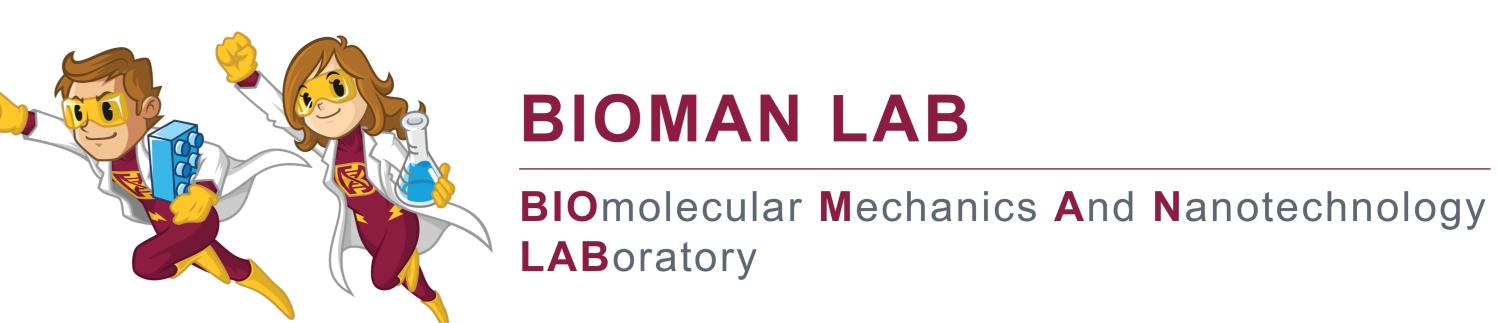
# Is a double-stranded DNA the simplest and fastest biomolecular rotary motor

Franky Djutanta<sup>a</sup>, Bernard Yurke<sup>b</sup> & Rizal F. Hariadi<sup>c</sup>

<sup>a</sup> The Biodesign Institute, Arizona State University, <sup>b</sup> Department of Physics, Boise State University, <sup>c</sup>Department of Physics  $\mathcal{E}$  the Biodesign Institute, Arizona State University.



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# sMotivation and background

- ► Molecular rotary motors are essential for living system.
- For instance,  $F_0F_1$ -ATP synthase converts adenosine diphosphate (ADP) into adenosine triphosphate (ATP) by rotary motion.
- ► However, to replicate a molecular rotary motor requires an uneasy process.
- ▶ dsDNA may have a potential of becoming a molecular rotary motor because of its helix shape. Under a uniform field, the helix shape may have generated moment across the axis of dsDNA.
- ► The twist motion caused by the moment will be proportional to the voltage applied.
- ► We thought of this possibility and conducted a fluid mechanics theoretical analysis by deducing from the Navier-Stokes equations.

### **Experimental Setup**

# Theoretical approach

- Molecular motors are
- ➤ The properties of the actomyosin interaction have mainly been examined at two levels: skinned muscle fibers and single molecule measurements
- Using a DNA nanotube scaffold, we have engineered artificial myosin filaments with defined organization.
- Using a DNA nanotube-based O-shaped Myosin gliding assay (O-Myo), we continuously monitored interactions between small myosin ensembles and single actin filaments.
  - Done step closer toward rigorous characterization of the lifetime of myosin motors.

# dsDNA Modification

# Questions

- In muscle, contraction and force generation emerge from the coordinated interactions between astronomical number of myosin motors and actin filaments.
- ► The properties of the actomyosin interaction have mainly been examined at two levels: skinned muscle fibers and
- single molecule measurements
- Using a DNA nanotube scaffold, we have engineered artificial myosin filaments with defined organization.
- ▶ Using a DNA nanotube-based O-shaped Myosin gliding assay (O-Myo), we continuously monitored interactions between small myosin ensembles and single actin filaments.
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### References