

# Biomolecular motors for directed assembly and hybrid devices

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Movie:

## **Microtubules**

polymerizing from  
tubulin protein subunits

**Kinesin** moving a vesicle

Movie extracted from:  
Alain Viel, Robert A. Lue,  
and John Liebler/XVIVO  
"The inner life of a cell"  
BioVisions at Harvard  
University

Channel diameter:

50  $\mu\text{m}$  vs.  
500 nm

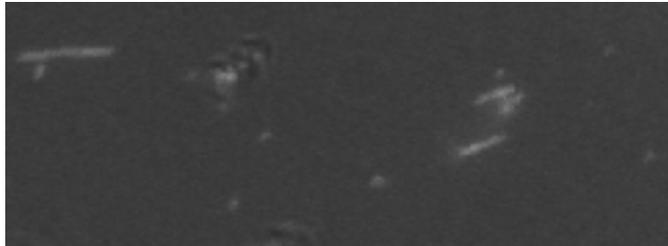
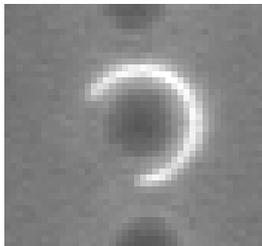
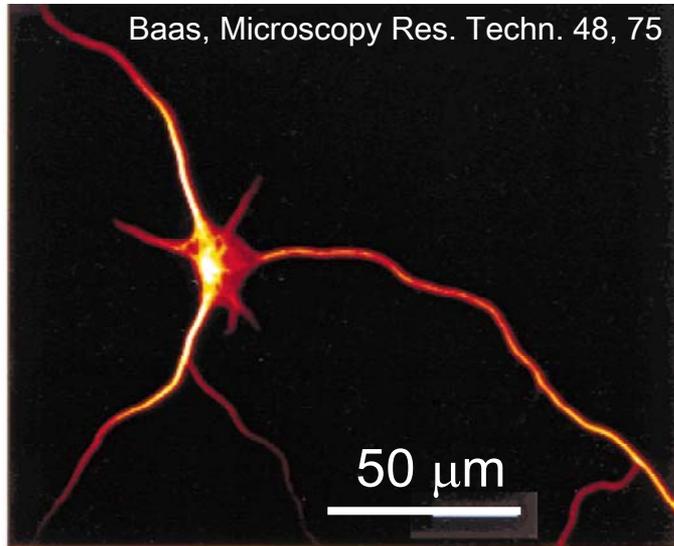
Sample volume:

500 nL vs.  
10 fL

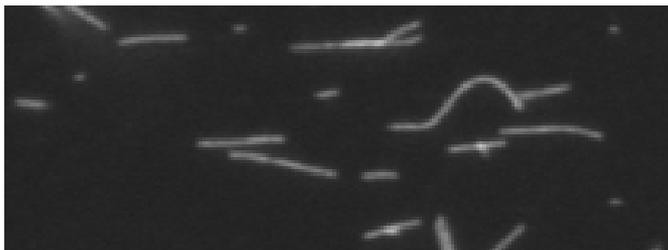
Flow velocity:

1 mm/s vs.  
1  $\mu\text{m/s}$

## Bio-Nanofluidics



Guiding  
Loading  
Control



## Smart dust sensor



# Smart dust sensor for remote detection of chem/bio agents

Directed by: George Bachand

Produced by: Sandia National Lab

In collaboration with:

Viola Vogel, ETH Zurich

Banahalli Ratna, Naval Research Lab

Peter Satir, A. Einstein College of Medicine

Henry Hess, University of Florida

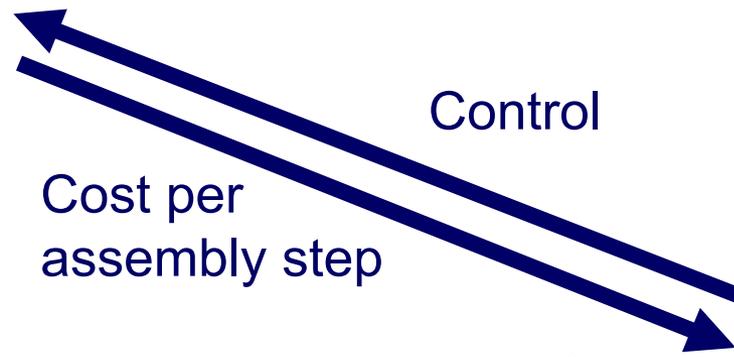
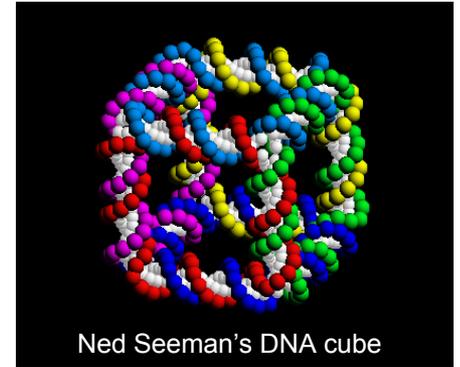
With support from the  
DARPA Biomolecular Motors program

# Self-assembly driven by biomolecular motors complements “Molecular Robotics”

Nanorobotics using AFM:



Thermally activated self-assembly:



Molecular Robotics with motor proteins:

