NANOWIRE INTERFACING WITH MOLECULAR MOTORS:

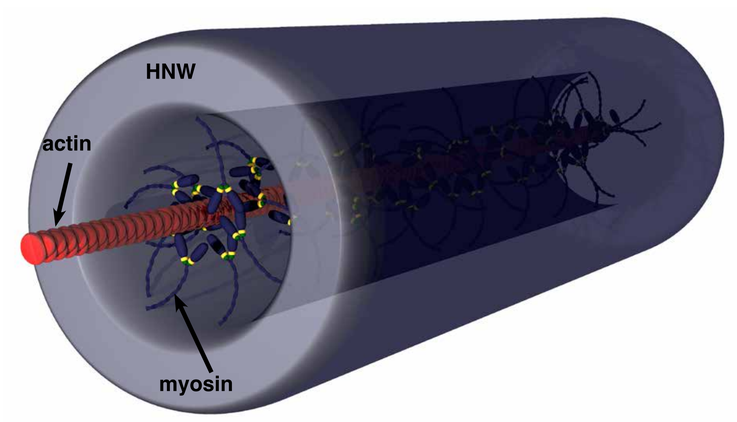
Light Guiding and Tunneling, nanowire fabrication

MERCY LARD[1,2], ALF MÅNSSON[3], ANDERS MIKKELSEN[1,4], HEINER LINKE[1,2]

1. NanoLund, Lund University, Sweden, 2. Solid State Physics, Lund University, Sweden,
3. Department of Chemistry and Biomedical Sciences, Linnaeus University, Kalmar, Sweden, 4. Synchrotron Radiation Research, Lund University, Sweden

Biomolecular motors offer directed transport, and can potentially replace pump-driven nanofluidics. However, in existing systems, transportation is limited to the two-dimensional plane. Here we demonstrate myosin-driven transport of actin filaments through hollow oxide nanotubes, with 80 nm inner diameters[1]. We also show light guiding of labeled filaments moving vertically along arrays of nanowires with 150–200 nm outer diameter and several micrometer lengths[2]. These systems enable 3D actomyosin interaction, for example, in lab-on-a-chip systems useful for scaffolding in bottom-up assembly of muscle proteins into 3D ordered contractile units, mimicking the muscle sarcomere or in biosensing, respectively.

Transport of molecular motors



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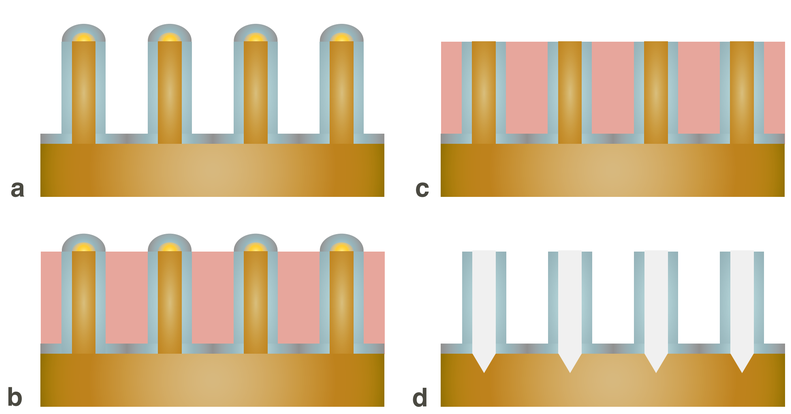
GaP nanowires are coated with 60 nm of Al_2O_3. The GaP core is etched away leaving behind HNWs (inner diameter 80 nm)[3]. Myosin molecules bound to the inner surface extending out about 40 nm[4], transport actin filaments (diameter 10 nm) through the wire.

Hollow nanowire fabrication



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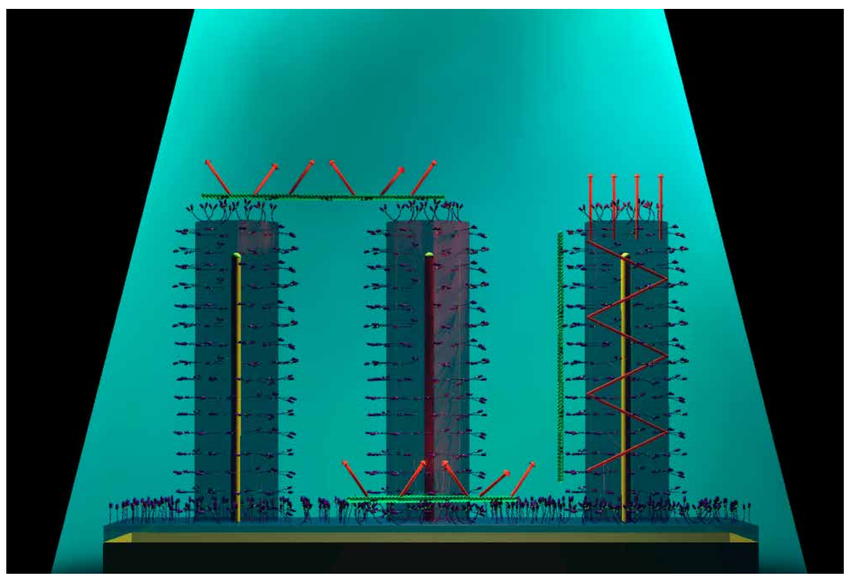

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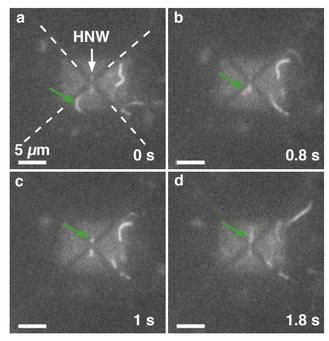

Conclusions

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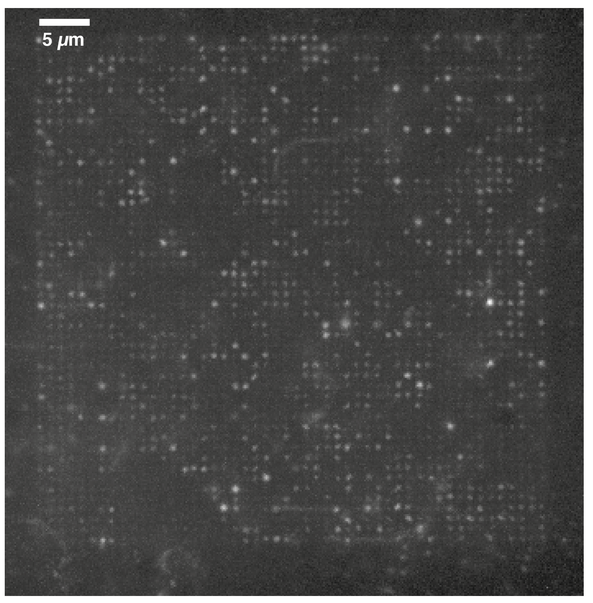

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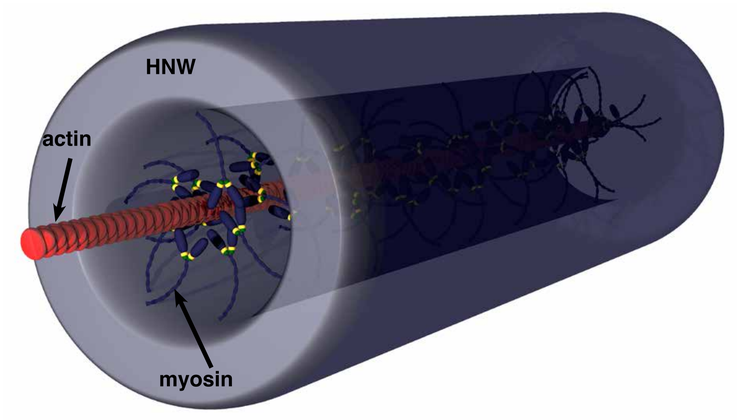

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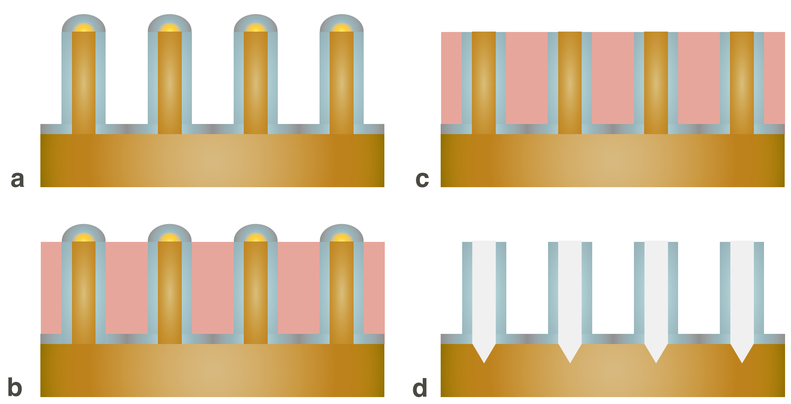

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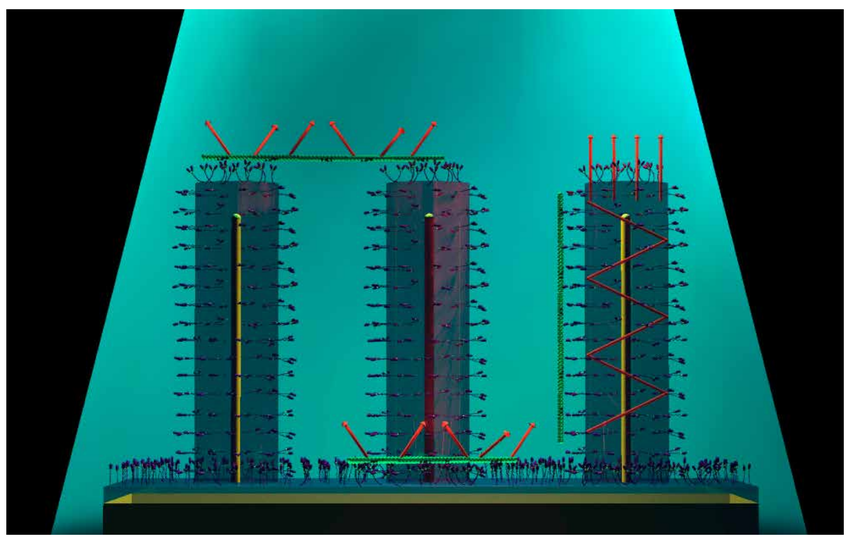

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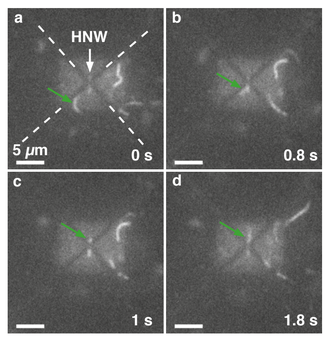

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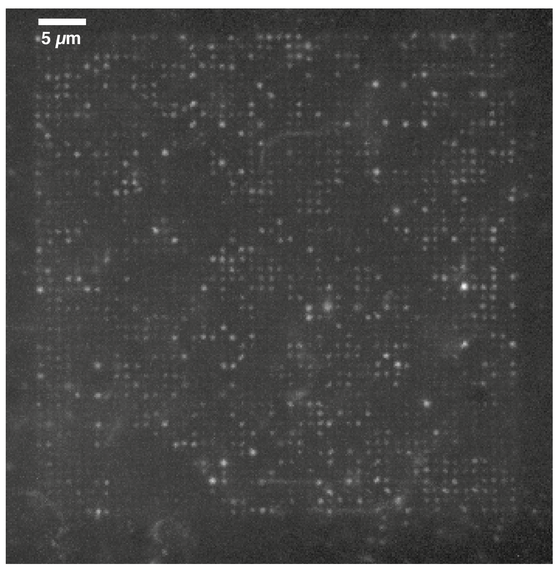

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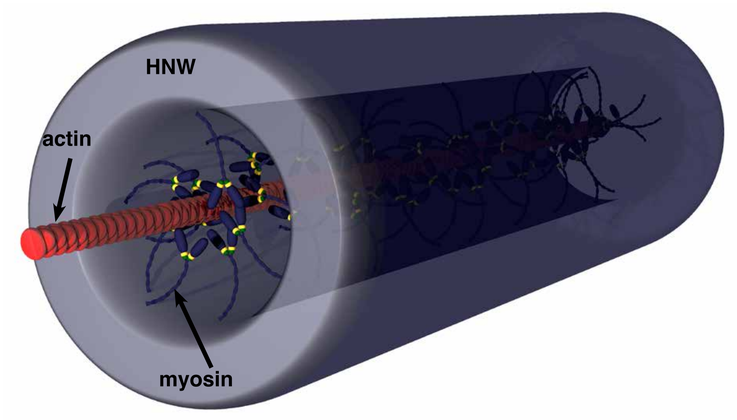

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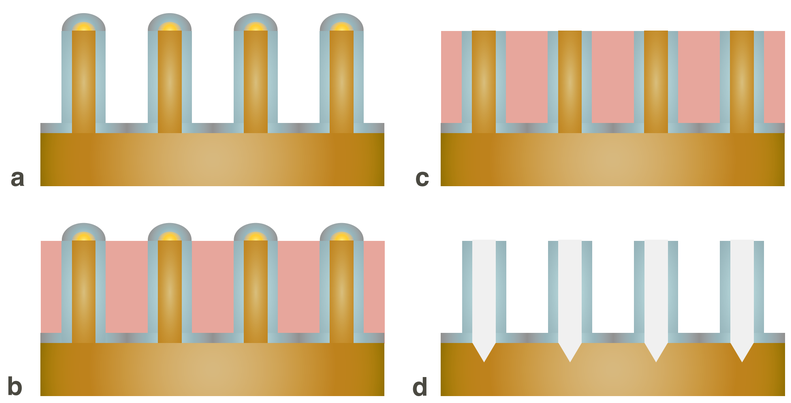

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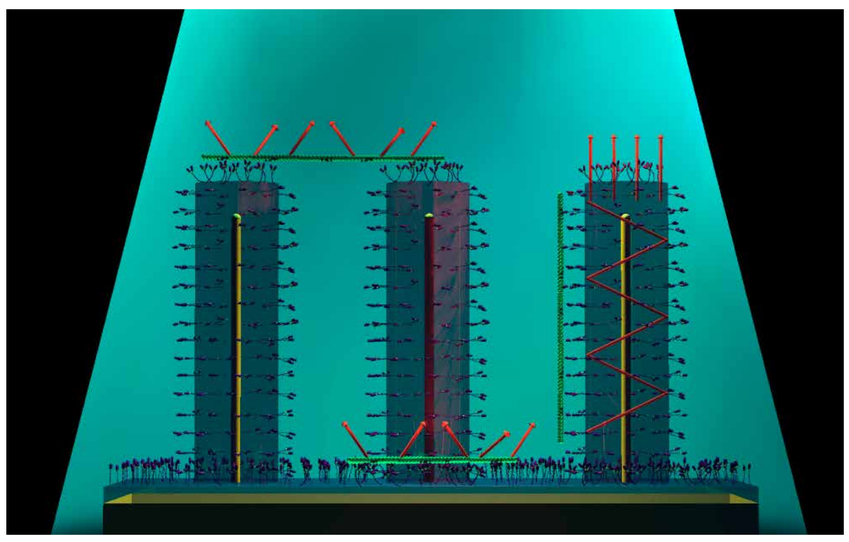

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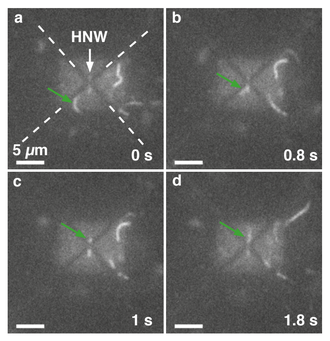

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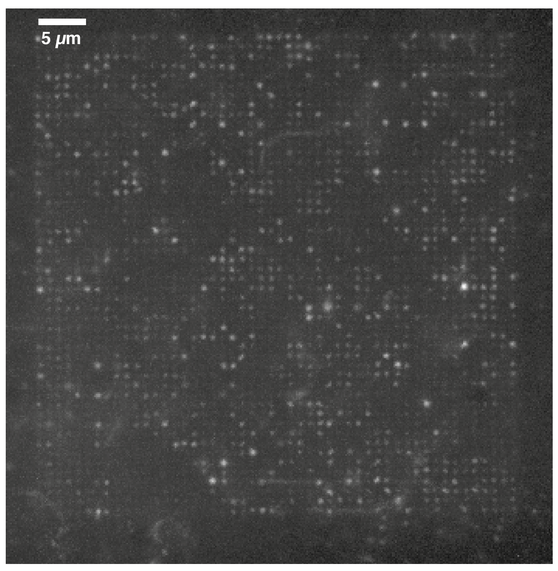

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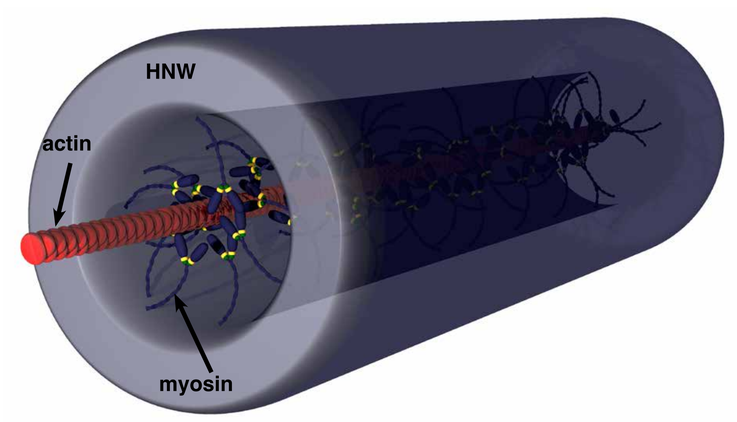

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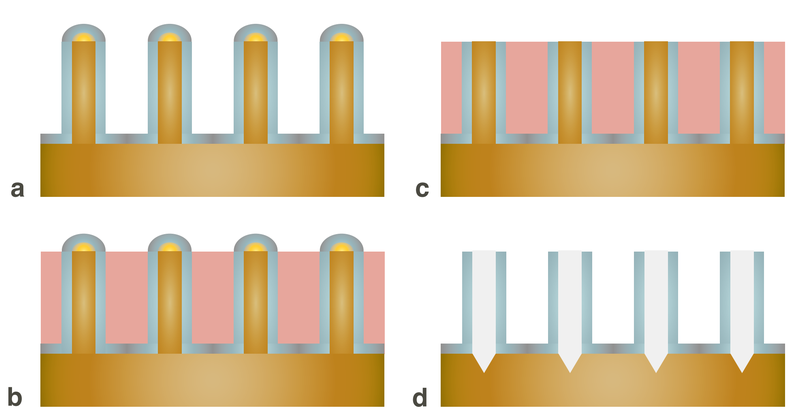

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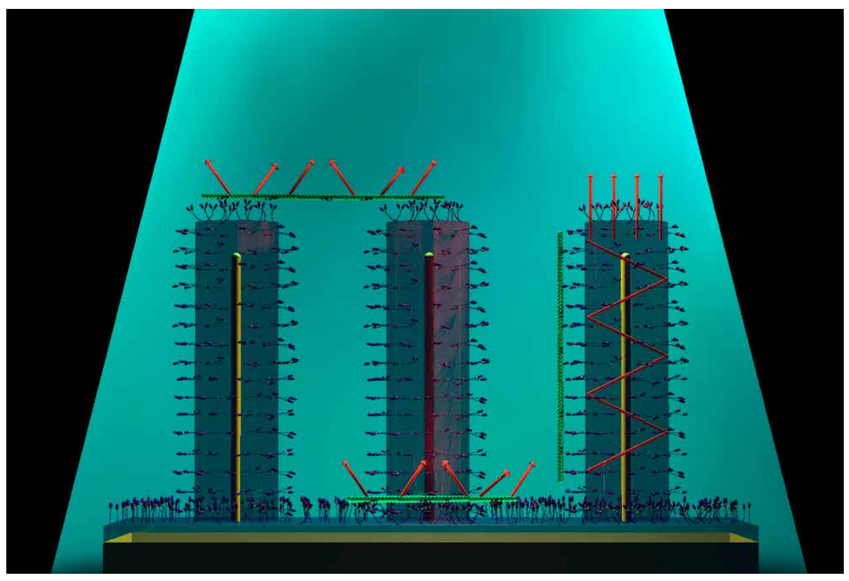

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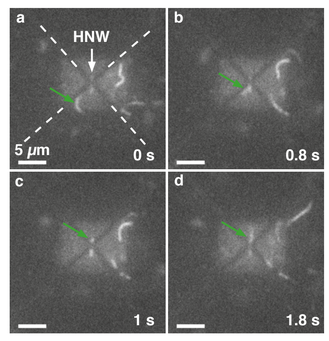

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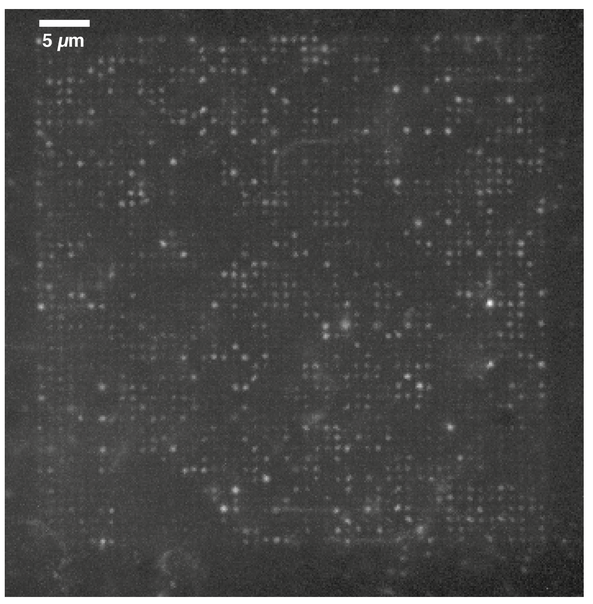

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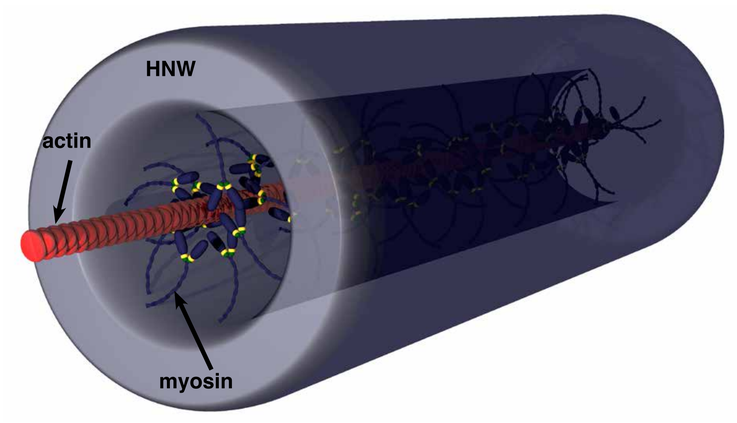

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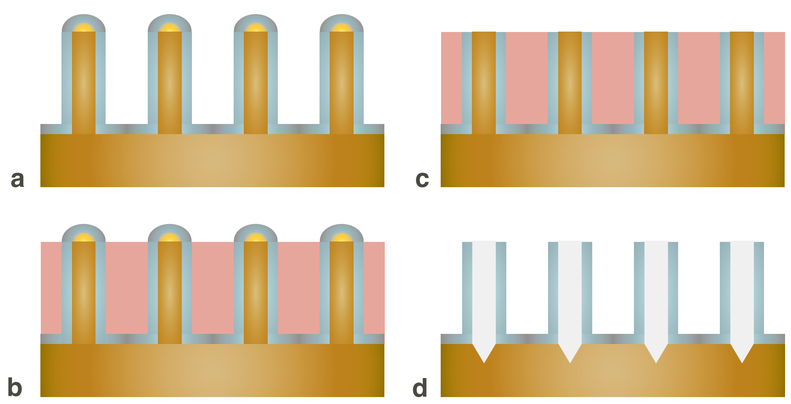

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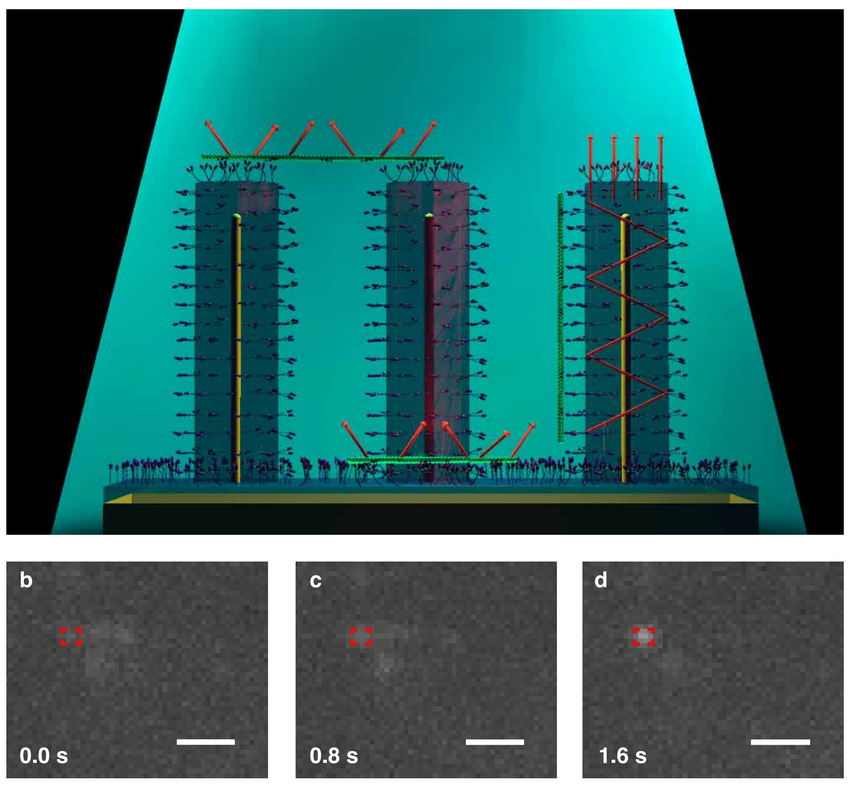

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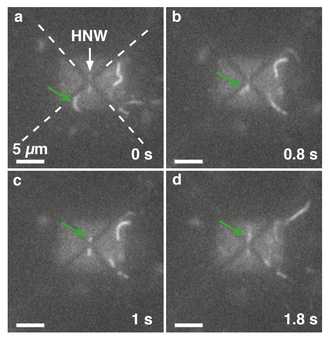

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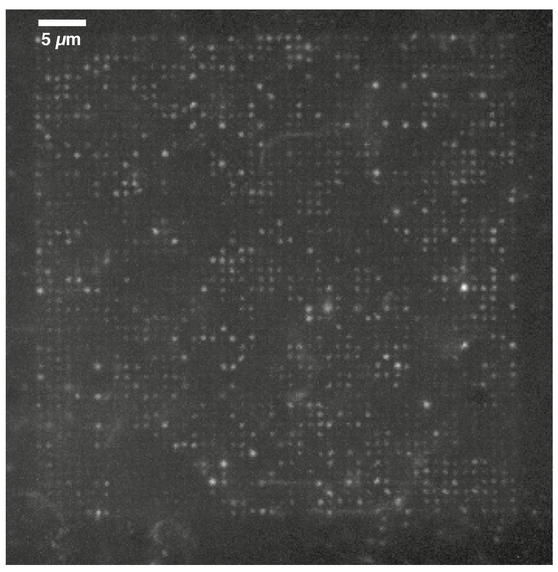

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