

# Magnetically Guided Self-Assembly

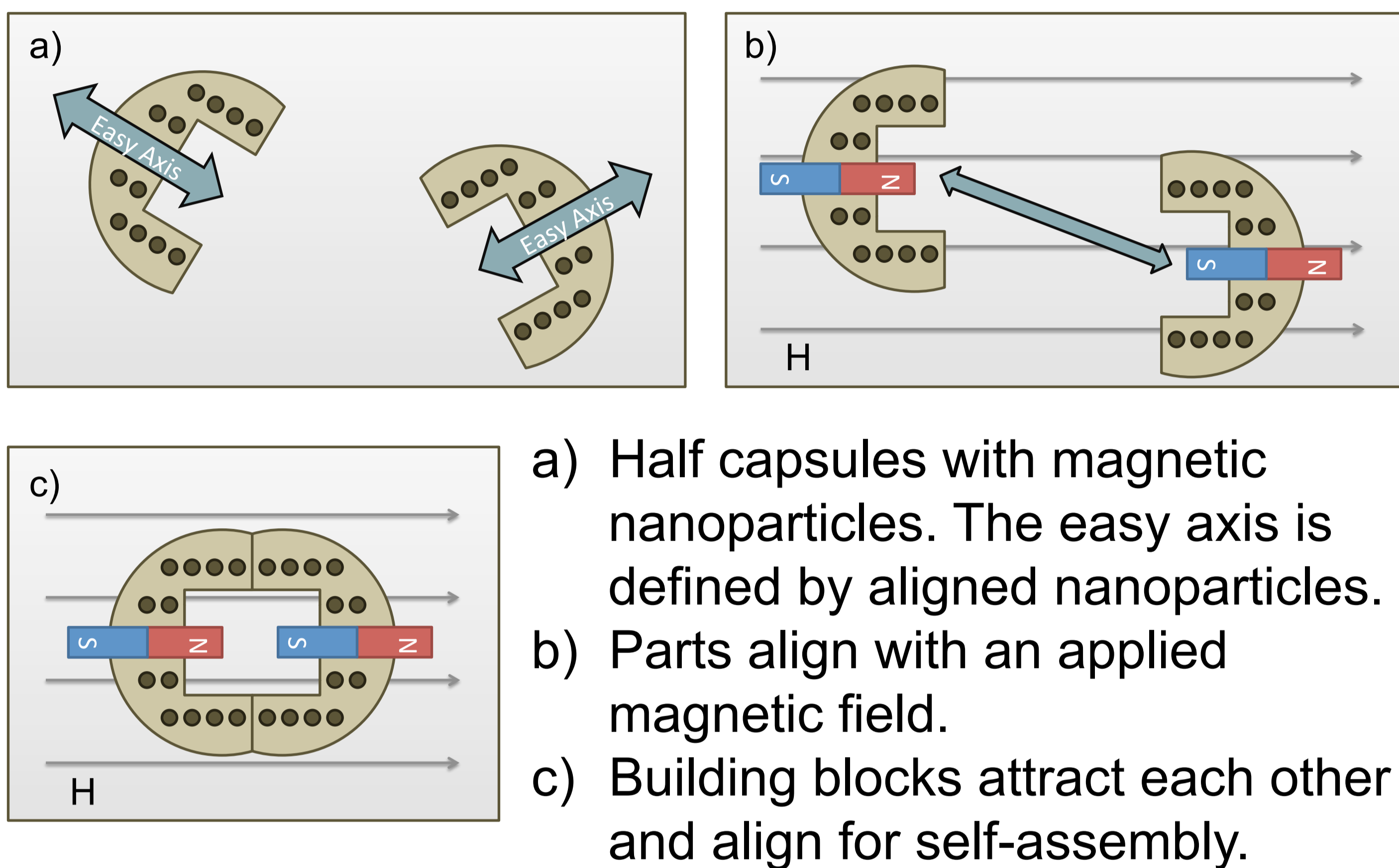
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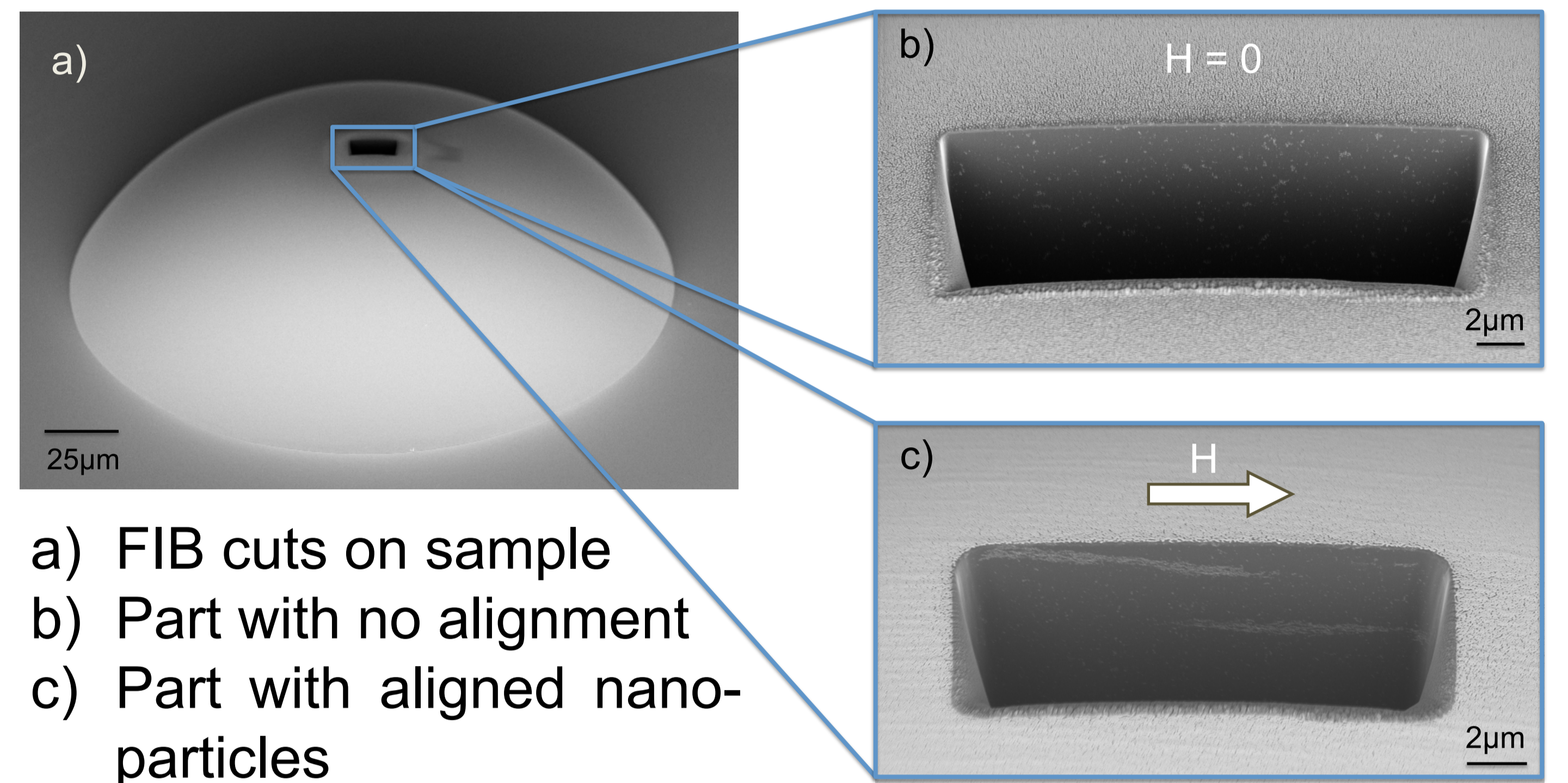
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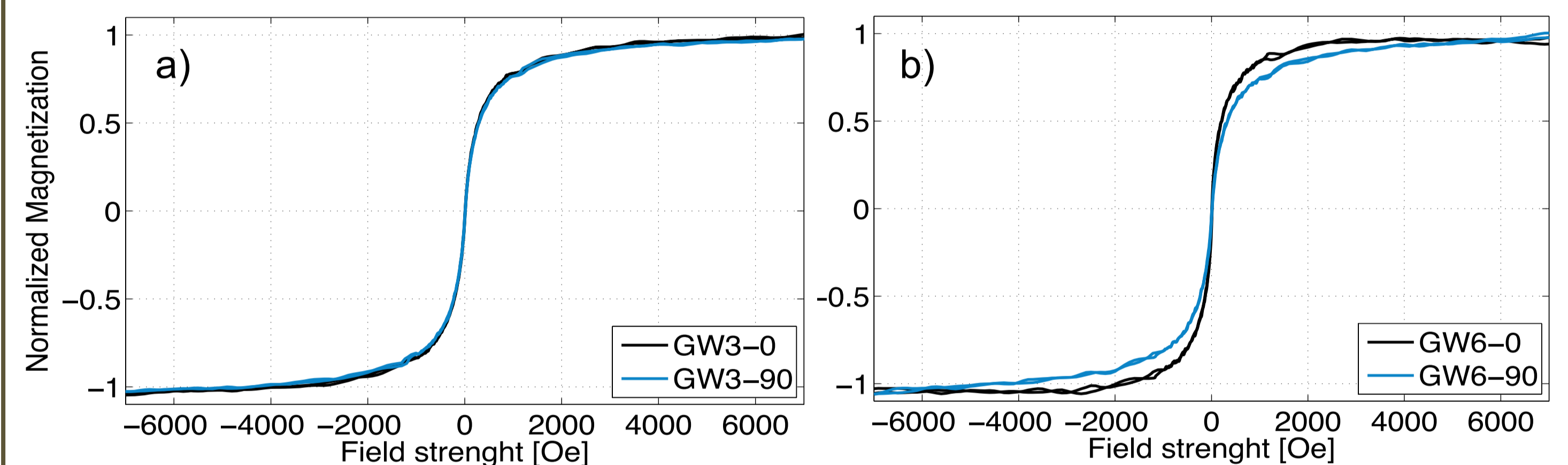
## Magnetic Guiding



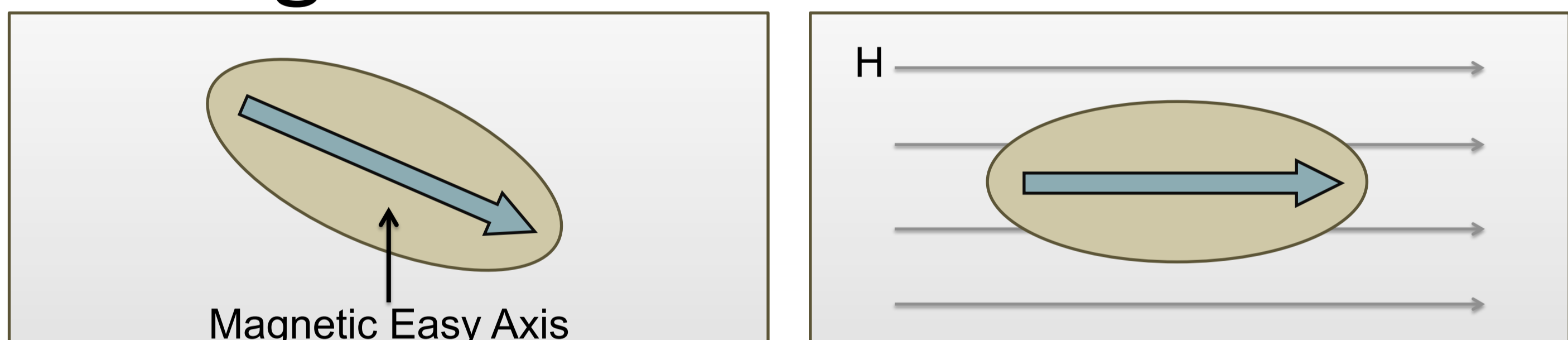
## Characterization



## Magnetic Properties



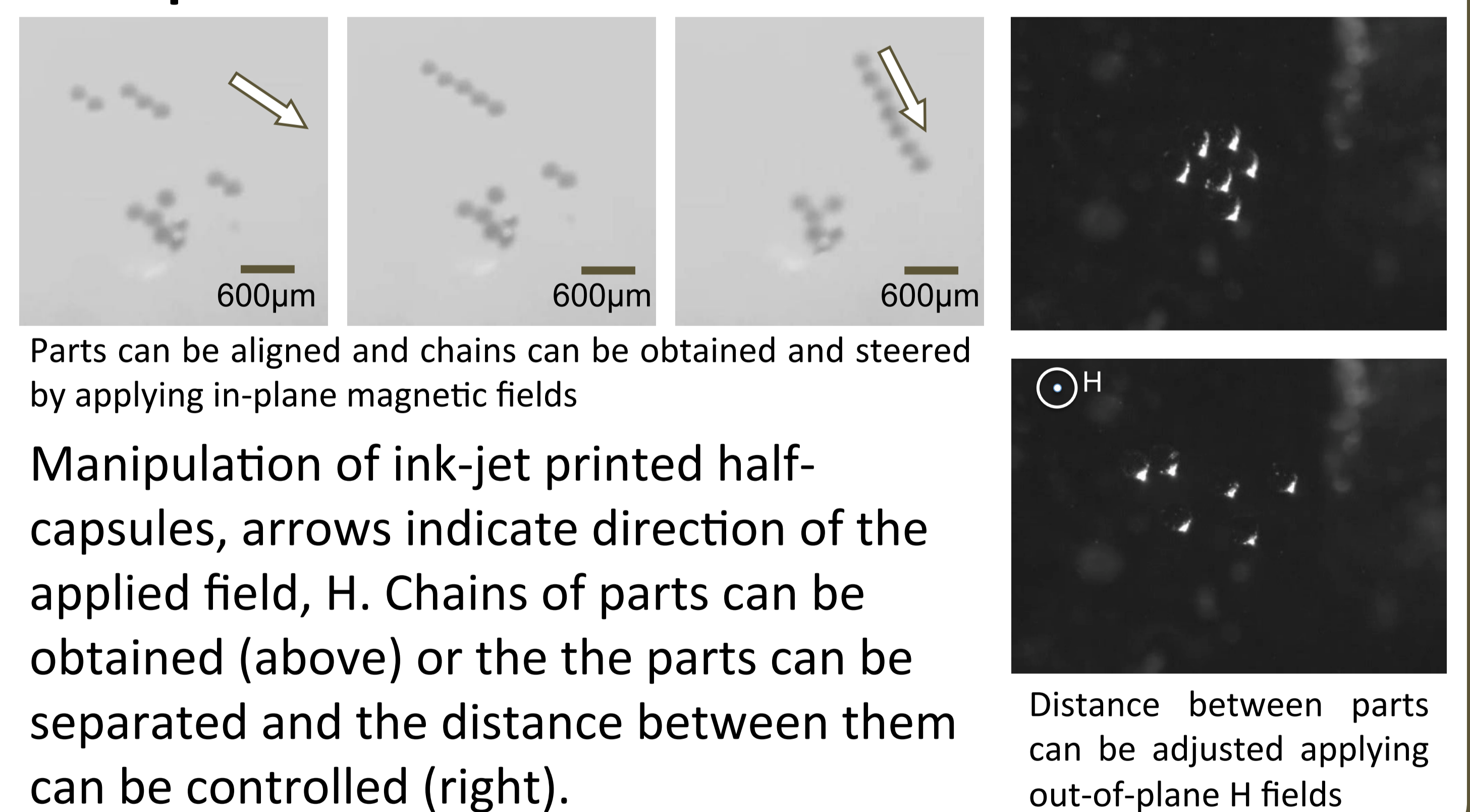
## Background



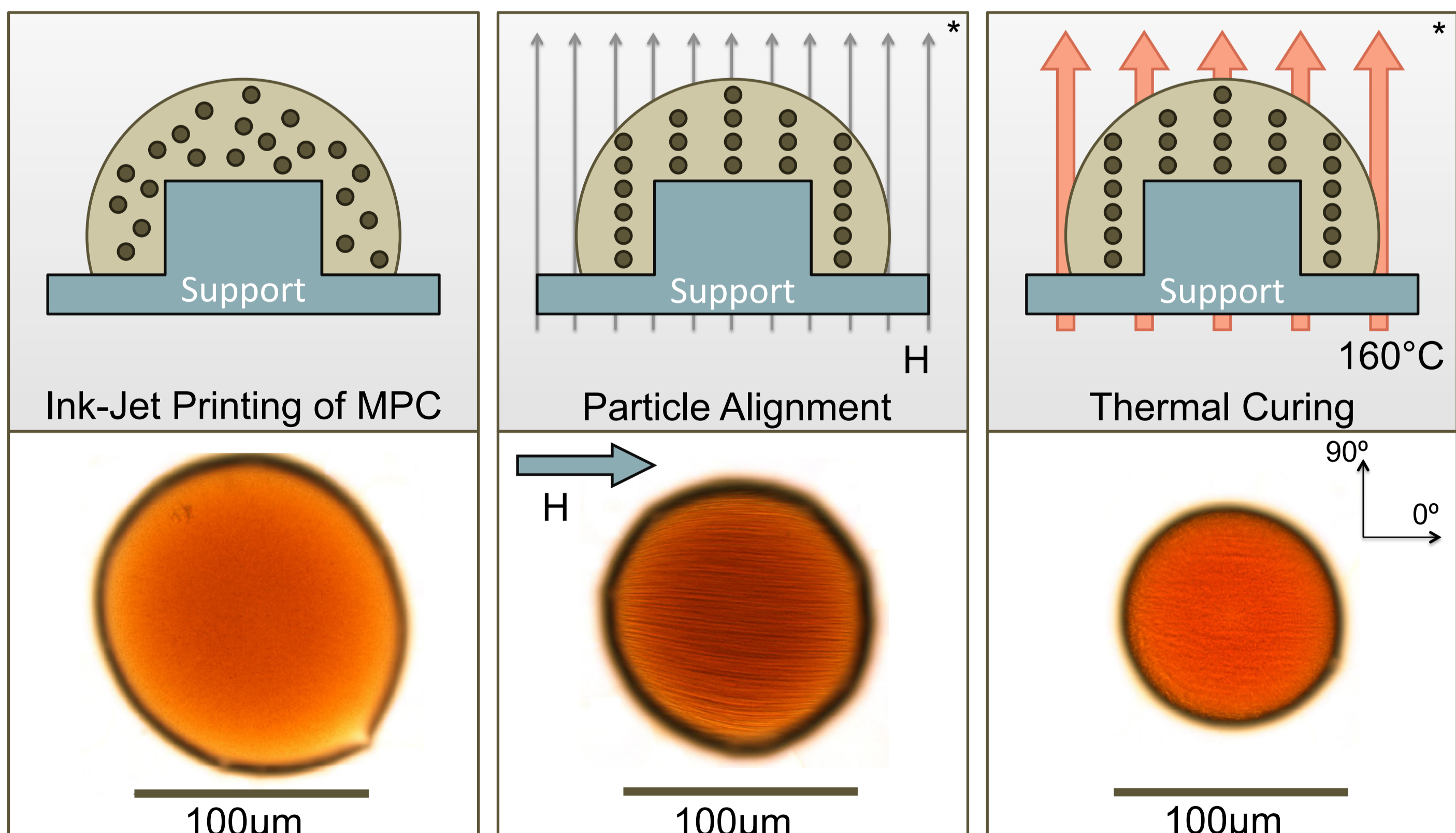
### Magnetic Anisotropy

- Refers to orientation-dependent magnetic properties
- Implies so-called easy axis along which a soft magnetic body aligns when subjected to an applied magnetic field
- For polymer composites (developed within SelfSys framework, [1]), anisotropy is solely related to shape

## Experimental



## Decoupling Shape & Anisotropy



- Inkjet printing of superparamagnetic nanoparticles embedded in uncured polymer matrix
- Alignment of nanoparticles by applying magnetic fields
- Thermal curing for fabrication of features beyond exposable resist thickness [1]

\* The alignment direction is shown as out-of-plane for illustration purposes unlike the photos below

## Conclusion & Outlook

A combination of ink-jet printing, nanoparticle alignment by applying homogenous magnetic fields, and thermal curing allows fabrication of magnetic half capsules. By magnetic manipulation, these parts can be guided for self-assembly.

This work has been carried out in the framework of SelfSys, scientifically evaluated by SNSF as well as financed by the Swiss Confederation and funded by Nano-Tera.ch.

[1] A photopatternable superparamagnetic nanocomposite: Material characterization and fabrication of microstructures M. Suter, O.Ergeneman, J.Zürcher, C.Moitzl, S.Pané, T.Rudin, S.E. Pratsinis, B.J.Nelson, C.Hierold, *Sens. Actuators B: Chem.*, (2011)