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

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]

Characterization

- A) FIB cuts on sample
- B) Part with no alignment
- C) Part with aligned nanoparticles

Magnetic Properties

- Same magnetic characteristics for the non-aligned parts in any direction
- Slope changes along different directions in aligned parts

Experimental

- Parts can be aligned and chains can be obtained and steered by applying in-plane magnetic fields
- Manipulation of ink-jet printed half-capsules, arrows indicate direction of the applied field, H. Chains of parts can be obtained (above) or the the parts can be separated and the distance between them can be controlled (right).

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.

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