

### Electronic Supplementary Information 1 (ESI\_1)



**ESI\_1.** (a) SEM image of SU-8 microstructures  $\sim 9\ \mu\text{m}$  high, (b) bright field image of SU-8 microstructures  $\sim 9\ \mu\text{m}$  thick, (c) bright field image of magneto-responsive microgears  $\sim 9\ \mu\text{m}$  thick.

Microstructures in figure (a) and (b) were prepared with the SU-8 photoresist of  $\sim 9\ \mu\text{m}$  thickness, which determined their height. The PDMS mold was obtained by replica molding from the SU-8 photoresist master template whose structures also had the same height, thus the depth of the microhollows was  $\sim 9\ \mu\text{m}$ .

The size and shape of the magneto-responsive particles were controlled by the dimensions of the PDMS mold. The height of the particles is determined by the depth of the PDMS microhollows. In our case the magnetic microgears were  $\sim 9\ \mu\text{m}$  high.