Developing Biotemplated Nanoparticles for Data Storage

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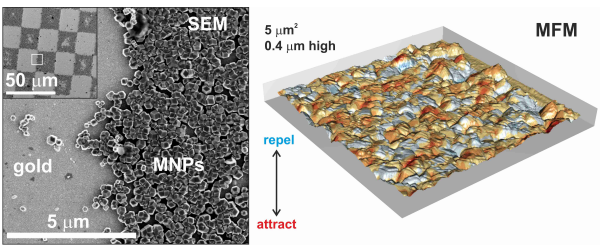
Magnetic nanoparticles (MNPs) are used in technologies from data storage to cancer treatment. For these applications, MNPs must have a uniform size and shape so that they have a uniform magnetic behavior. Making thin-films of MNPs for data storage usually requires costly, energy intensive processes. Biotemplating proteins and peptides form specific crystallographic phases of uniform nanoparticles under mild reaction conditions *in vivo* and *in vitro*.[1, 2] Here I will discuss recent work in which we showed that the biomineralization protein Mms6 from a magnetic bacterium was able to biotemplate high quality magnetite nanoparticles onto a patterned surface.[3, 4] This was the first time that magnetic materials have been biotemplated onto surfaces. As magnetite has a low coercivity, it's magnetization is easy to switch, so we have been using a dual affinity peptide (Ac-HPPMNASHPHMH-GSG-KTHEIHSPLLHK-Am) to both bind to a silicon surface and biotemplate the formation of CoPt *in situ*.[5] We are optimising the formation of the $L1_0$ phase of CoPt, which has a high out of plain magnetic anisotropy, so this can be used in data recording. These bioinspired approaches, will allow us to form technologically relevant magnetic materials using green chemistry.



[1] Galloway, Bramble & Staniland (2013), *Chem Eur J* **19**, 8710-8725 [2] Galloway & Staniland (2012), *J. Mater. Chem.* **22**, 12423-12434 [3] Galloway, Bramble, Rawlings, Burnell, Evans & Staniland (2012), *Small* **8**, 204-208 [4] Galloway, Bramble, Rawlings, Burnell, Evans & Staniland (2012), *J. Nano Res.* **17**, 127-146 [5] Galloway, Bird, Bramble, Critchley, Staniland (2013) *MRS Spring 1569*, LL02-LL11