Magnetic field assisted assembly of DNA coated colloids

D. Joshi1[1*], M. Zupkauskas[1], T.J. O'Neill[1], S.H. Nathan[1], E. Eiser[1]

[1]*Cavendish Laboratory - University of Cambridge, Cambridge, UK*

**dj310@cam.ac.uk*

Self-assembly of long, straight, mesoscopic scaffolds can be utilised for building more complicated structures [1,2]. Using the right combination of DNA, it is possible to tune the melt temperatures for single, two and three component systems of DNA coated colloids(DNAcc). We present an approach for creating novel superstructures via magnetic field-assisted assembly of DNAcc. Recent publications show chains of short lengths [3–5] and/or short persistence lengths [6]. Introducing superparamagnetic beads as one of the components allows us to manipulate their assembly via an externally applied magnetic field. Ring like and long coaxial skeletons of smaller colloids around larger superparamagnetic cores are demonstrated in a two component system. Proof of concept is demonstrated for further stabilizing these structures by adding a suitably functionalized third component. This could pave the way for novel superstructures such as mesoscopic straight coaxial scaffolds, where a bilayer of different colloids is attached to a rigid primary support. These superstructures could also be developed for novel drug delivary systems or utilized as template materials in supercapacitors.

[1] N. Geerts and E. Eiser, *Soft Matter*, **6**, 4647 (2010).
[2] L. Di Michele and E. Eiser, *Phys. Chem. Chem. Phys.* **15**, 3115 (2013).
[3] B. Y. Kim, I.-B. Shim, O. L. a Monti, and J. Pyun, *Chem. Commun.* **47**, 890 (2011).
[4] R. Dreyfus, J. Baudry, M. L. Roper, M. Fermigier, H. A Stone, and J. Bibette, *Nature*, **437**, 862 (2005).
[5] V. T. Mukundan, Q. M. Nhat Tran, Y. Miao, and A. T. Phan, *Soft Matter*, **9**, 216 (2013).
[6] D. Li, J. Rogers, and S. L. Biswal, *Langmuir*, **25**, 8944 (2009).