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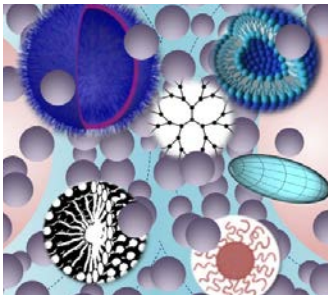
University of BRISTOL

Soft Matter @ Interfaces Final Year Projects

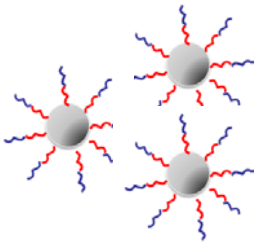
Fundamentals of nanotoxicology

Very little is known of nanoparticles' impact on our health and environment. This project aims to study interactions between nanoparticles and soft matter in order to add to our fundamental understanding of this emerging and important field.



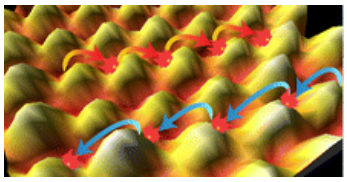
Nanofluids mediating surface forces

Much of the efficacy of nanostructures in modern bio-nanotechnology depends on how they mediate the interactions between surfaces that confine them. We will measure such interactions directly using a surface forces apparatus, using model nanofluids containing polymersomes, liposomes, dendrimers, micelles and inorganic nanoparticles of different sizes, shapes and surface chemistry.



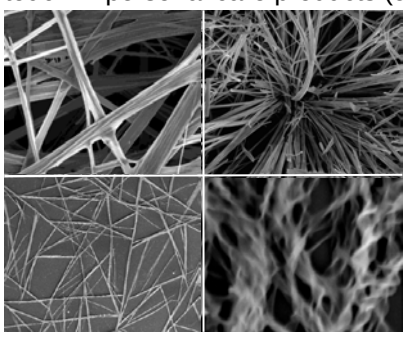
Intelligent polymers on nanoparticles

Polymers that swell or change conformations according to solution conditions will be grown directly from nanoparticles, for potential future biomedical applications such as drug delivery.



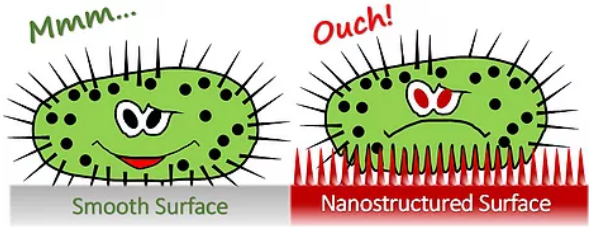
Sensation and communication of nanostructured surfaces

Friction is vitally important and universally relevant in nanoscience and biological living systems (e.g. in knee joints or sensation of finger-tip touching). Nanostructured surfaces are increasingly used in modern applications and miniaturized devices (such as solar cells, coatings, biosensors etc.), where nanosized surface features with well-defined geometry and dimensions are incorporated for tailored functionalities and properties. It is thus crucially important to understand their frictional properties. In particular, we collaborate with Proctor & Gamble to understand sensation of touch in personal care products (*e.g.* nappies and sanitary pads).



Artistry of self-assembly. Language of geometry.

From mesmerizing intricacy of an ammonite shell to chilled elegance of a snow flake, *nature* articulates langue of shape and geometry fluently and delivers complex patterns and structures on all length scales with ease and panache *via* self-assembly. We aspire to harness such refined linguipotence of geometry to create sophisticated hierarchical nanostructures with tailored architecture and enhanced functionalities, using an ingenious yet simple evaporation controlled self-assembly (ECSA) method.



Mimetic bacterial membranes

Antimicrobial resistance is a major challenge we face. Here we design mimetic membranes with which underpins future strategies for alternative therapies.