PhD studentship in mechanical properties of nacre-like ceramics

Department/Faculty: Department of Materials, Faculty of Engineering
Duration: 36 months

Supervisors: Dr Florian Bouville

Ceramics are stiff and potentially strong materials uniquely capable of resisting to extreme environments: heat, corrosion, radiation. This resistance put them as prime candidate for tomorrow’s critical device in transportation, aeronautic, and biomedical applications. The only thing holding them back is their intrinsic brittleness that make them very sensitive to defects and prone to catastrophic failure.

Natural materials have found ways around this problem by adapting their microstructure at multiple length scales. This architecturation provides failure mechanisms that increase their damage tolerance by orders of magnitude compare to the pure ceramic they are based upon. Starting from seashell’s structure blueprint, nacre-like ceramics and composites have been recently developed and can now get properties on par with some of the state-of-the-art composites used in aeronautic applications. With efforts and insights on these materials, we could be able to push even further their performances.

The role of the PhD candidate will be to design new nacre-like ceramics to work at high temperature, to study in depth their micromechanical behavior, and to provide in the end potential materials candidates to replace ceramic used in today’s systems.

The candidate will learn during her/his stay colloids science, ceramic processing, sintering techniques, structural characterizations, and fracture mechanics along with strong skills in scientific methods, problem solving, and scientific results communications.

We are seeking applications from excellent, motivated and curious UK (or EU with UK residency proof) candidates with a minimum 2:1 (or equivalent) first degree in Materials Science, Chemistry or Applied Physics for a three-year PhD studentship. The project will be based in the Centre for Advanced Structural Ceramics (http://www3.imperial.ac.uk/structuralceramics) and the Department of Materials at Imperial College London. This three-year studentship will provide full ‘home rate’ fees plus the standard maintenance stipend to UK and EU students who meet the residency criteria (currently a stipend of £16,553).

Applications will be processed as received. For questions or further details regarding the project, please contact Dr Florian Bouville, f.bouville@imperial.ac.uk.

Closing Date: one month from placement

For questions regarding the admissions process, please contact Materials student office (materialsstudentoffice@imperial.ac.uk). Formal applications can be completed online but only after informal enquiries: http://www3.imperial.ac.uk/materials/research/phdopportunities while information about the Department can be found at http://www3.imperial.ac.uk/materials.