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Editorial: Biologically inspired materials: recent advances

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Biologically inspired materials are of prime importance and are a cornerstone for various biomedical applications. With more sophisticated fabrication and characterisation tools, a broad range of materials can be examined for their utilisation. Current research is focused on developing bioinspired materials for unique applications, such as cartilage tissue engineering and delivery of therapeutic nanoparticles. More recently, materials from renewable resources such as plants and microbial organisms have gained an increased amount of attention from researchers.

This issue highlights the recent and significant research activities involved in developing potential biomass into polymeric materials, as well as their end use applications. The collection of four contributions from leading experts provides a broad perspective of recent advances in bioinspired materials.

Marine microbial organisms such as mussels demonstrate an extraordinary fibrous structure that is responsible for its superior mechanical strength. To illustrate the importance and applications of mussel byssus protein fibres, Reddy and co-workers[1] have reviewed the recent advances of developing biomimetic materials based on mussel byssal threads. The authors present a correlation between the structure, property and performance of this unique bioinspired material.

Another interesting development in the field of bioinspired materials is hydrogels. Hydrogels are polymer-based network structure that can swell considerably without dissolving in water, thus providing significantly high water content. Hydrogels hold great potential in tissue engineering and drug-delivery applications. An example of the work of Borchers and group[2] where the authors establish a practical interlink between a three-dimensional bio-artificial matrices and its cellular response, in vitro.

Hydrogels hold applications in other scientific fields, such as thermosensitive gels. In topics like the interactive effects of β-glycerolphosphate molecules on thermosensitive chitosan-based hydrogels[3] the focus shifts from bone support material to injectable hydrogels. This illustrates the importance of a rather novel and growing application, biomimetic injectable hydrogels, which also needs to address the effect of various components and their effect on physico-chemical and biological properties.

The research continues with the development of bioinspired nanoparticles in the work of Motevalian,[4] where the nanoparticles could be used for local drug delivery by penetrating through the blood–brain barrier.

In conclusion, this issue shows the importance and influence of bioinspired materials for various biomedical applications and we hope that the spark of these biologically inspired materials ignites in the reader as well as prospective researchers.

Furthermore, with this journal's 'ahead of print' publication, where articles are published online in advance of the printed issue, we anticipate further success in 2016.

We acknowledge all the authors for their valuable and timely contributions and the reviewers for their constructive critiques in making this issue possible.

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