

Morphology-genetic materials inspired from nature species

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Biological materials naturally display an astonishing variety of sophisticated nanostructures that are difficult to obtain even with the most technologically advanced synthetic methodologies. Inspired from nature materials with hierarchical structures, many functional materials are developed based on the templating synthesis method.

This review will introduce the way to fabricate novel Morpho-genetic materials based on nature bio-structures with a great diversity of morphologies, in State Key Lab of Metal Matrix Composites, Shanghai Jiao Tong University recently. We focused on replicating the morphological characteristics and the functionality of a biological species (e.g. plants, leaves, butterfly wings). We change their original components into our desired materials with original morphologies faithfully kept. Properties of the obtained materials are studied in details. Based on these results, we discuss the possibility of using these materials in photonic control, solar cells, electromagnetic shielding, energy harvesting, and gas sensitive devices, et al. In addition, the fabrication method could be applied to other nature substrate template and inorganic systems that could eventually lead to the production of optical, magnetic, or electric devices or components as building blocks for nanoelectronic, magnetic, or photonic integrated systems. These bioinspired functional materials with improved performance characteristics are becoming increasingly important, which will have great values on the development on structural function materials in the near future.

References

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Biography

Di Zhang has received his PhD from Osaka University, Japan. He is now a chair professor of Shanghai Jiao Tong University. He is a professor of Materials Science and Engineering at Shanghai Jiao Tong University in China (since 1994), the director of State Key Lab of Metal Matrix Composites and the Institute of Composite Materials at SJTU (since 2003), and the Professor of Chang Jiang Scholars Program (since 2001).

His research interests include the process of advanced metal matrix composites and the basic and applied research on biomimetic morphology-genetic materials. Prof. Zhang has published more than 300 peer reviewed academic articles, 1 English academic book on morphology-genetic materials, and attended international conferences as invited speakers for more than 40 times. His works on bioinspired functional materials has been widely reported by many famous scientific media (e.g., "Discovery Channel News") in the world.