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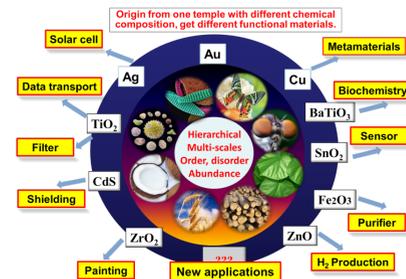
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Bioinspired materials templates by nature species

Di Zhang, Jiajun Gu, Wang Zhang, Qinglei Liu, Shenming Zhu, and Huilan Su
State key lab of metal matrix composites, Shanghai Jiao Tong University, China

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 functional materials based on nature bio-structures with a great diversity of morphologies, in State Key Lab of Metal Matrix Composites, Shanghai Jiao Tong University in near five years. We focused on replicating the morphological characteristics and the functionality of a biological species (e.g. wood, agriculture castoff, 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 increasing important, which will have great values on the development on structural function materials in the near future.

Figure 1. Bioinspired materials templates by nature species with various applications



References

- 1 Zhang D, et al. *Progress in Materials Science*. **68**, 67-96(2015).
- 2 Zhang D, et al. *Advanced Materials*. **27**, 464-478(2015)
- 3 Zhang D, et al. *Advanced Materials*. **26**, 1229-1234(2014)

Biography:

Professor ZHANG Di, male, was born in March 1957. He is a professor of materials science of the “Yangtze River (Changjiang) Scholarship Scheme”. In March 1988, he acquired his PhD degree from Osaka University, Japan. Now he is the vice dean of the School of Materials Science and Engineering, the director of the Institute of Composite Materials and the deputy director of the State Key Laboratory of Metal Matrix Composites of SJTU, and concurrently an executive member of the Chinese Society of Composite Materials, the head of its Professional Committee on Metal Matrix and Ceramics Composites, an editing member of the Chinese Journal of Nonferrous Metals and Acta Materiae Compositae Sinica and a member of the Committee of the Development of Functional Wood Ceramics of the New Energy & Industrial Technology Development Organization of Japan. His research focuses on light weight and high strength materials, metal matrix composites and materials used for ceramic cells and fuel cell. His development of the in-situ reinforced Ti-based composites and the Mg-Li-based composites are of international level while his research in the recent years has brought to the great attention of the industrial circle and the academic circle of Japan of the fabrication of wood ceramics from the waste wood-based materials such as wood pulp fiber and of the fabrication the green composites by composition of the wood ceramics and metals that has an integration of structure and function. Breakthrough has been achieved in solving the problems in the development of the key materials for long life ceramic cell. Electrolyte substrate of molten carbonate fuel cells (MCFC) has been developed, with a successful trial of power generation of it. In the recent five years, he has taken up 19 research projects of the National Natural Science Foundation, the Cross-century Talent Fund of the State Ministry of Education and other international cooperations, etc., the total cost of which has amounted to 4.53 million Chinese Dollar. He has his 349 research papers indexed by SIC published, H-index is 38. He owns 2 international patents.