

Science Bridges China Research Profile

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SUMMARY OF MY RELEVANT RESEARCH AREAS:

Mainly engaged in the science and engineering research of advanced carbon fibre reinforced resin composites, bio-composites and nano fibre based nanomaterials

主要从事先进碳纤维树脂基复合材料、生物复合材料和纳米纤维等方向的科学与工程研究

Primary Research interests:

1. Advanced composite materials are based on high-performance fibers (including carbon-fiber, aramid fiber, PBO fiber, etc.) reinforced resin matrix composite materials by advanced winding, prepreg, pultrusion and other forming process, to study the high performance composite structure, process and performance relationship. The aim is to set up the domestic leading advanced composite materials research platform and to achieve the actual application of the advanced composite materials in aerospace, aviation, basic industry and other areas.
2. The preparation of nano-fiber, nano-fiber based composite (heterozygous) materials by electrospinning method and the basic research about the relationship of their structure and function. The first aspect is to use electrospinning method to develop the tissue engineering scaffolds materials, such as PLLA, gelatin, PLLA/HA, PLLA/MWCNTs/HA, PLGA/gelatin, β -TCP/CNFs, β -TCP ceramic nano fiber hybrid or composite system, as well as the three layer structure of the guided tissue regeneration membrane (GTR) system design, preparation, biological research and etc, in order to develop the new oral guided tissue regeneration membrane and bone repair materials, with size, composition the same as extracellular matrix and composition, structure, properties able to be designed. Subsequently, the new methods and mechanisms of nano fiber membrane (such as PSF and engineering plastic with CNTs) interlayer toughened and reinforced CNFs composite materials are put forward. And the nano-fiber (PMMA-PAN core scabbard structure) in situ reinforced Bis-GMA photocuring composite system is developed. Particularly the development of PAN-based carbon nanofiber (CNFs) and M, MOX/CNFs nano-fiber composite systems is achieved, with the focus on the study of traditional carbon fiber hot drawing, pre-oxidation, carbonization and other preparation technology applied to electrospinning carbon nanofiber and M, MOX composite nanofibers and the associated relationship between structure and properties. Thus prepared PAN-based CNFs, Sn/CNFs, SnOx/CNFs, TiO₂/CNFs, β -TCP/CNFs and other new material system, studied the application in electrochemistry, photocatalytic and biological function, achieved the innovation of series of nano-fiber composites.

Topics in which you would like to develop collaborative research:

The preparation of nano-fiber, nano-fiber based composite materials by electrospinning method, which were applied as the tissue engineering scaffolds materials and energy materials

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.

1. with Chungnam National University, Korea, preparation and characterization of carbon materials, 2001-present
2. with EADS of France, preparation and characterization of PAN based carbon nano fiber films, 2007-present
3. with Washington State University, USA, exploring new generation of carbon fiber composites and nanofiber based energy materials, 2006-present
4. with Carnegie Mellon University, USA, preparation and characterization of polymer grafted nanoparticles, 2009-present
5. with Peking University, China, preparation and application of nanofiber based biomedical materials, 2006-present

Publications and other outputs relevant to your interest in this programme (up to 5)

1. Wei Sun, Qing Cai, Peng Li, Xuliang Deng, Ruifeng Lin, **Xiaoping Yang**. Post-draw PAN-PMMA Nanofiber Reinforced and Toughened Bis-GMA dental Restorative Composite, *Dental Materials*, 2010, 26: 873-880
2. Gang Sui, Bin Li, Weihong Zhong, G Bratzel, **Xiaoping Yang**. Carbon Nanofiber/Polyetherimide Composite Membranes with Special Dielectric Properties. *Soft Matter*, 2009, 5, 3593-3598
3. Gang Li, Chen Zhang, Yang Wang, Peng Li, Yunhua Yu, Xiaolong Jia, Haiyang Liu, **Xiaoping Yang**, Zhongmin Xue, Seungkon Ryu. Interface correlation and toughness matching of phosphoric acid functionalized Kevlar fiber and epoxy matrix for filament winding composites. *Composites Science and Technology*, 2008, 68(15-16): 3208-3214
4. Haiyang Liu, Qing Cai, Pengfei Lian, Zhou Fang, Shun Duan, Seungkon Ryu, **Xiaoping Yang***, and Xuliang Deng, The biological properties of carbon nanofibers decorated with β -tricalcium phosphate nanoparticles, *Carbon*, 2010, 48:2266-2272
5. Xiaolong Jia, Jessica Listak, Witherspoon Velencia, E. Eric Kalu, **Xiaoping Yang**, Michael Bockstaller. Effect of matrix molecular weight on the coarsening mechanism of polymer-grafted gold nanocrystals. *Langmuir*, 2010, 26(4): 12190-12197
6. Jianying Ji, Sui Gang, Yu Yunhua, Liu Yanxin, Lin Yuanhua, Du Zhongjie, Ryu Sungkun, **Xiaoping Yang***. Significant improvement of mechanical properties observed in highly aligned carbon-nanotube-reinforced nanofibers. *The Journal of Physical Chemistry C*, 2009, 113, 4779-4785.
7. Yu Yunhua, Yang Qing, Teng Donghua, Yang Xiaoping, Ryu Seungkon. Reticular Sn nanoparticle-loaded PAN-based carbon nanofibers as monolithic anodes for rechargeable Li-ion batteries, *Electrochemistry Communications*, 2010