Research Profile

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Position: Professor

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SUMMARY OF MY RELEVANT RESEARCH AREAS:

Oriented Self-reinforcing polymer materials, Polymer/Graphene nano-composites, Polymer hydrogels, Engineering plastics

取向自增强高分子材料设计与制备，聚合物/石墨烯纳米复合材料制备及应用，高性能聚合物凝胶结构设计与制备，高性能工程塑料结构设计与制备

Primary Research interests:

Oriented self-reinforcing polymer materials: Structure and blood/bio-compatibility of highly oriented poly(lactic acid) produced by solid hot stretching; Self-reinforcing polyoxymethylene with highly mechanical and thermal-conductive properties; Oriented nylon 6 with improved thermal and hydrothermal stability

Polymer/Graphene nano-composites: Functionalization of grapheme; Chitosan/GO nano-composite hydrogel for controlled pH- and glucose-responsive drug release application; Nylon 6/GN nano-composites with highly improved tribological properties, electrically conductive property and thermal stability; Polyvinyl alcohol(PVA)/GO nano-composite hydrogel for heavy metal ion removal

Polymer hydrogels: Polyvinyl alcohol hydrogel for wound dressings, nerve conduit and articular cartilage application; Chitosan hydrogel for controlled pH- and glucose-responsive drug release application; Polyvinyl alcohol(PVA) hydrogel immobilized with microorganism applied in waste water treatment; Starch-based superabsorbent polymer

Topics in which you would like to develop collaborative research:

Development of poly (vinyl alcohol) based hydrogels for potential use as an articular cartilage replacement through 3D bio-printing technology

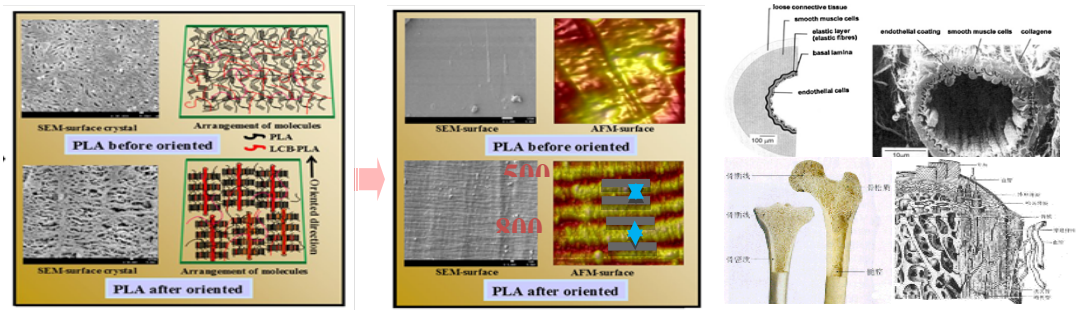
The joint replacement orthopedic surgery has been accomplished for over 30 years mainly due to the employment of ultra-high molecular weight polyethylene (UHMWPE). However, the excessive wear of UHMWPE can lead to bone dissolution, causing eventual failure of prosthetic replacement. Due to high elastic modulus, good biocompatibility, non-toxicity and bio-tribological properties, poly (vinyl alcohol) (PVA) hydrogels have been considered as excellent replacement of cartilaginous tissues. However, PVA hydrogels may have poor mechanical properties by lack of adequate compression and shear resistance to withstand severe loading applied to articular surface. This research aims to develop PVA based hydrogels with high mechanical and bio-tribological properties for potential use as cartilage replacement. By molecular structure /network structure control and in situ crosslinking technology, the reinforcing and toughening of PVA hydrogel will be realized, and the wear resistance and self-lubrication property will be improved. Furthermore, the 3D gel bio-printing technology will be studied and applied to the manufacture of PVA-based hydrogel, which will be significantly important for direct cartilage repair with high precision.

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

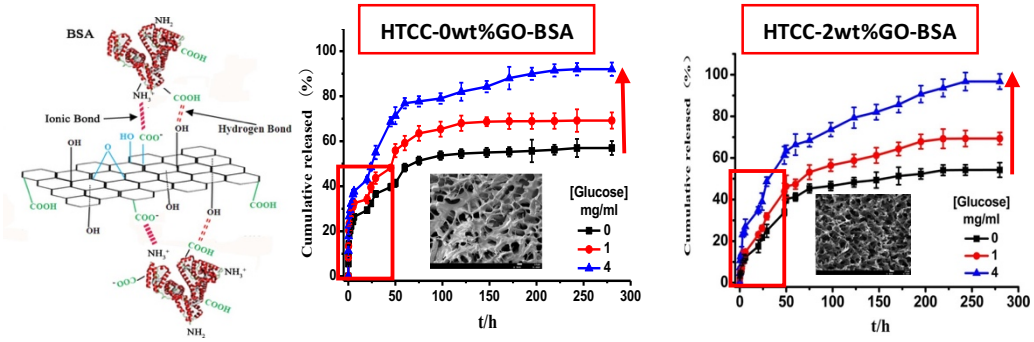
- Sub-project of Science Bridge China Project (Cooperation with Bradford University)
- International Scientific and Technological Cooperation Project of Sichuan Province (Cooperation with Bradford University)

Relevant graphics, figures, pictures:

Use this area to show pictures or scientific figures which illustrate your research

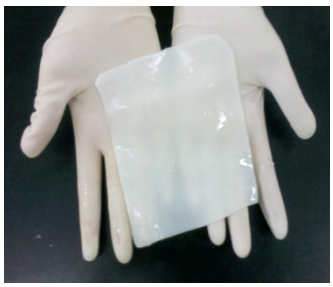


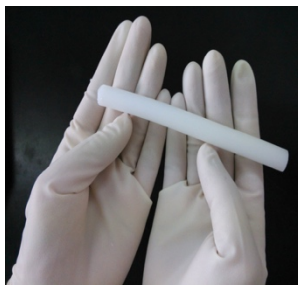
Formation mechanism of micro-grooves and bionic structure of oriented LCB-PLA



Controlled pH- and glucose-responsive drug release behavior of chitosan based nano-composite hydrogels by using graphene oxide as drug nano-carrier

Industrial product of PVA hydrogel immobilized with microorganism





PVA hydrogel for wound dressing and nerve conduit application

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

1. Xue Zou, Xiaowen Zhao*, Lin Ye, Synthesis of cationic chitosan hydrogel and its controlled glucose-responsive drug release behaviour. Chemical Engineering Journal, 2015, 273: 92-100
2. Zhe Lian, Lin Ye*, Synthesis and properties of carboxylated poly(vinyl alcohol) hydrogels for wound dressings, Journal of Polymer Research, 2015, 22(5): 72
3. Xiaowen Zhao, Lin Ye*, Phil Coates, Phil Caton-Rose, Michasel Martyn, Structure and blood compatibility of highly oriented poly(lactic acid)/thermoplastic polyurethane blends produced by solid hot stretching. Polym. Adv. Technol., 2013, 24: 853–860
4. Chengjie Li, Meng Xiang, Lin Ye, Intercalation behavior and orientation structure of graphene oxide/polyethylene glycol hybrid material. RSC Advances, 2016, 6(76): 72193-72200
5. Xiaowen Zhao, Lin Ye*, Structure and properties of highly oriented polyoxymethylene/multi-walled carbon nanotube composites produced by hot stretching. Composites Science and Technology, 2011,71: 1367