Xiang-Zhao Mao

List of Publications by Year in Descending Order

126 papers	1,749 citations	23 h-index	35 g-index
134 ext. papers	2,538 ext. citations	5.9 avg, IF	5.59 L-index

#	Paper	IF	Citations
126	Design, Preparation, and Evaluation of Enteric Coating Formulation of HPMC and Eudragit L100 on Carboxylated Agarose Hydrogel by Using Drug Tartrazine.. *BioMed Research International*, **2022**, 2022, 1042253	3	
125	Properties and Anti-Ultraviolet Activity of Gallic Acid-Chitosan-Gelatin Mixed Gel. *Journal of Ocean University of China*, **2022**, 21, 204-212	1	
124	A label-free colorimetric aptasensor based on split aptamers-chitosan oligosaccharide-AuNPs nanocomposites for sensitive and selective detection of kanamycin. *Talanta*, **2022**, 238, 123032	6.2	7
123	Discovery and characterization of a novel □-fucosidase from the marine-derived Flavobacterium algicola and its application in 2′-fucosyllactose production. *Food Chemistry*, **2022**, 369, 130942	8.5	3
122	Emerging roles of the aptasensors as superior bioaffinity sensors for monitoring shellfish toxins in marine food chain. *Journal of Hazardous Materials*, **2022**, 421, 126690	12.8	3
121	Biochemical characterization and cleavage pattern analysis of a novel chitosanase with cellulase activity.. *Applied Microbiology and Biotechnology*, **2022**, 106, 1979	5.7	3
120	Enzymatic Verification and Comparative Analysis of Carrageenan Metabolism Pathways in Marine Bacterium Flavobacterium algicola.. *Applied and Environmental Microbiology*, **2022**, e0025622	4.8	2
119	Development of a Label-Free Colorimetric Aptasensor with Rationally Utilized Aptamer for Rapid Detection of Okadaic Acid. *Journal of Ocean University of China*, **2022**, 21, 400-408	1	0
118	A Biodegradable Multifunctional Film as a Tissue Adhesive for Instant Hemostasis and Wound Closure.. *Macromolecular Rapid Communications*, **2022**, e2200031	4.8	
117	The microbial stress responses of Escherichia coli and Staphylococcus aureus induced by chitooligosaccharide.. *Carbohydrate Polymers*, **2022**, 287, 119325	10.3	2
116	Boosting expression level of plectasin in recombinant Pichia pastoris via 2A self-processing peptide assembly.. *Applied Microbiology and Biotechnology*, **2022**, 1	5.7	1
115	Development of a colorimetric aptasensor fabricated with a group-specific aptamer and AuNPs@Fe nanozyme for simultaneous detection of multiple diarrheic shellfish poisons.. *Talanta*, **2022**, 246, 123534	6.2	0
114	Dietary Supplementation with Exogenous Sea-Cucumber-Derived Ceramides and Glucosylceramides Alleviates Insulin Resistance in High-Fructose-Diet-Fed Rats by Upregulating the IRS/PI3K/Akt Signaling Pathway. *Journal of Agricultural and Food Chemistry*, **2021**, 69, 9178-9187	5.7	5
113	Exogenous phosphatidylglucoside alleviates□cognitive impairment by improvement of neuroinflammation, and neurotrophin signaling. *Clinical and Translational Medicine*, **2021**, 11, e332	5.7	1
112	Preparation of Sulforaphene from Radish Seed Extracts with Recombinant Food-Grade Harboring High Myrosinase Activity. *Journal of Agricultural and Food Chemistry*, **2021**, 69, 5363-5371	5.7	2
111	Evaluation of a clean fermentation-organic acid method for processing shrimp waste from six major cultivated shrimp species in China. *Journal of Cleaner Production*, **2021**, 294, 126135	10.3	3
110	Advances in agaro-oligosaccharides preparation and bioactivities for revealing the structure-function relationship. *Food Research International*, **2021**, 145, 110408	7	2

109	Laminarin and Laminarin Oligosaccharides Originating from Brown Algae: Preparation, Biological Activities, and Potential Applications. *Journal of Ocean University of China*, **2021**, 20, 641-653	1	10
108	Biotechnology advances in β-carotene production by microorganisms. *Trends in Food Science and Technology*, **2021**, 111, 322-332	15.3	15
107	Construction of a Super-Folder Fluorescent Protein-Guided Secretory Expression System for the Production of Phospholipase D in. *Journal of Agricultural and Food Chemistry*, **2021**, 69, 6842-6849	5.7	0
106	Comparative evaluation of phosphatidylcholine and phosphatidylserine with different fatty acids on nephrotoxicity in vancomycin-induced mice. *Bioscience, Biotechnology and Biochemistry*, **2021**, 85, 1873-1884	2.1	2
105	Identification of a GDSL lipase from Streptomyces bacillaris and its application in the preparation of free astaxanthin. *Journal of Biotechnology*, **2021**, 325, 280-287	3.7	2
104	Properties and potential applications of mannuronan C5-epimerase: A biotechnological tool for modifying alginate. *International Journal of Biological Macromolecules*, **2021**, 168, 663-675	7.9	2
103	Lipid extraction from Greenland halibut (Reinhardtius hippoglossoides) by-product in low-voltage DC electric field and its mechanism. *Journal of Cleaner Production*, **2021**, 283, 124673	10.3	2
102	Characterization of TEMPO-oxidized chitin nanofibers with various oxidation times and its application as an enzyme immobilization support. *Marine Life Science and Technology*, **2021**, 3, 85-93	4.5	1
101	Effect of gum ghatti on physicochemical and microstructural properties of biodegradable sodium alginate edible films. *Journal of Food Measurement and Characterization*, **2021**, 15, 107-118	2.8	0
100	A comparative study of the effects of phosphatidylserine rich in DHA and EPA on Aβ-induced Alzheimer's disease using cell models. *Food and Function*, **2021**, 12, 4411-4423	6.1	2
99	Biotechnological Production of 2′-Fucosyllactose: A Prevalent Fucosylated Human Milk Oligosaccharide. *ACS Synthetic Biology*, **2021**, 10, 447-458	5.7	8
98	Porphyran and oligo-porphyran originating from red algae Porphyra: Preparation, biological activities, and potential applications. *Food Chemistry*, **2021**, 349, 129209	8.5	12
97	A competitive colorimetric aptasensor transduced by hybridization chain reaction-facilitated catalysis of AuNPs nanozyme for highly sensitive detection of saxitoxin. *Analytica Chimica Acta*, **2021**, 1173, 338710	6.6	3
96	Engineering a carbohydrate binding module to enhance chitinase catalytic efficiency on insoluble chitinous substrate. *Food Chemistry*, **2021**, 355, 129462	8.5	3
95	Development of a terminal-fixed aptamer and a label-free colorimetric aptasensor for highly sensitive detection of saxitoxin. *Sensors and Actuators B: Chemical*, **2021**, 344, 130320	8.5	8
94	Biochemical characterization of two β-N-acetylglucosaminidases from Streptomyces violascens for efficient production of N-acetyl-d-glucosamine. *Food Chemistry*, **2021**, 364, 130393	8.5	2
93	Advances and perspectives of aptasensors for the detection of tetracyclines: A class of model compounds of food analysis. *Food Chemistry*, **2021**, 364, 130361	8.5	7
92	Short-term supplementation of DHA-enriched phospholipids attenuates the nephrotoxicity of cisplatin without compromising its antitumor activity in mice. *Food and Function*, **2021**, 12, 9391-9404	6.1	0

91	Applying Both Chemical Liquefaction and Enzymatic Catalysis Can Increase Production of Agaro-Oligosaccharides from Agarose. *Journal of Ocean University of China*, **2020**, 19, 1371-1377	1	1
90	Biological synthesis and anti-HeLa cells effect of glycosylated bafilomycins. *Process Biochemistry*, **2020**, 99, 96-102	4.8	
89	A Novel Soluble Squalene-Hopene Cyclase and Its Application in Efficient Synthesis of Hopene. *Frontiers in Bioengineering and Biotechnology*, **2020**, 8, 426	5.8	1
88	Macroporous Hydrogel Dressing: A Macroporous Hydrogel Dressing with Enhanced Antibacterial and Anti-Inflammatory Capabilities for Accelerated Wound Healing (Adv. Funct. Mater. 21/2020). *Advanced Functional Materials*, **2020**, 30, 2070132	15.6	0
87	Application of secondary amine switchable hydrophilicity solvents for astaxanthin extraction from wet Haematococcus pluvialis. *Algal Research*, **2020**, 48, 101892	5	7
86	A rapid, easy, and sensitive method for detecting His-tag-containing chitinase based on ssDNA aptamers and gold nanoparticles. *Food Chemistry*, **2020**, 330, 127230	8.5	3
85	A Novel Route for Agarooligosaccharide Production with the Neoagarooligosaccharide-Producing Agarase as Catalyst. *Catalysts*, **2020**, 10, 214	4	2
84	Molecular and Microbial Signatures Predictive of Prebiotic Action of Neoagarotetraose in a Dextran Sulfate Sodium-Induced Murine Colitis Model. *Microorganisms*, **2020**, 8,	4.9	2
83	Identification of an alkaline lipase capable of better enrichment of EPA than DHA due to fatty acids selectivity and regioselectivity. *Food Chemistry*, **2020**, 330, 127225	8.5	12
82	Chitopentaose protects HaCaT cells against H2O2-induced oxidative damage through modulating MAPKs and Nrf2/ARE signaling pathways. *Journal of Functional Foods*, **2020**, 72, 104086	5.1	6
81	Radioprotective effects and mechanisms of animal, plant and microbial polysaccharides. *International Journal of Biological Macromolecules*, **2020**, 153, 373-384	7.9	18
80	Characterization of a novel glycoside hydrolase family 46 chitosanase, Csn-BAC, from Bacillus sp. MD-5. *International Journal of Biological Macromolecules*, **2020**, 146, 518-523	7.9	18
79	Biochemical characterization and degradation pattern analysis of a novel PL-6 alginate lyase from Streptomyces coelicolor A3(2). *Food Chemistry*, **2020**, 323, 126852	8.5	9
78	The First Genome Survey of the Antarctic Krill () Provides a Valuable Genetic Resource for Polar Biomedical Research. *Marine Drugs*, **2020**, 18,	6	3
77	A Macroporous Hydrogel Dressing with Enhanced Antibacterial and Anti-Inflammatory Capabilities for Accelerated Wound Healing. *Advanced Functional Materials*, **2020**, 30, 2000644	15.6	80
76	Formulation of vitamin C encapsulation in marine phospholipids nanoliposomes: Characterization and stability evaluation during long term storage. *LWT - Food Science and Technology*, **2020**, 127, 109439	5.4	11
75	Expression and characterization of a novel glycoside hydrolase family 46 chitosanase identified from marine mud metagenome. *International Journal of Biological Macromolecules*, **2020**, 159, 904-910	7.9	5
74	New type of green extractant for oil production: Citric acid/citric acid sodium extraction system. *Food Chemistry*, **2020**, 310, 125815	8.5	4

73	Comparative Investigation into Formycin A and Pyrazofurin A Biosynthesis Reveals Branch Pathways for the Construction of -Nucleoside Scaffolds. *Applied and Environmental Microbiology*, **2020**, 86,	4.8	11
72	Natural flavor ester synthesis catalyzed by lipases. *Flavour and Fragrance Journal*, **2020**, 35, 209-218	2.5	12
71	UV-shielding alginate films crosslinked with Fe containing EDTA. *Carbohydrate Polymers*, **2020**, 239, 115480	8.3	14
70	Chitosan: Structural modification, biological activity and application. *International Journal of Biological Macromolecules*, **2020**, 164, 4532-4546	7.9	82
69	A novel thermostable serine protease from a metagenomic library derived from marine sediments in the East China Sea. *Applied Microbiology and Biotechnology*, **2020**, 104, 9229-9238	5.7	5
68	Agarose degradation for utilization: Enzymes, pathways, metabolic engineering methods and products. *Biotechnology Advances*, **2020**, 45, 107641	17.8	9
67	Characteristics and applications of alginate lyases: A review. *International Journal of Biological Macromolecules*, **2020**, 164, 1304-1320	7.9	35
66	Biotechnological Advances in Lycopene Cyclases. *Journal of Agricultural and Food Chemistry*, **2020**, 68, 11895-11907	5.7	1
65	Biotechnological production of lycopene by microorganisms. *Applied Microbiology and Biotechnology*, **2020**, 104, 10307-10324	5.7	17
64	Marine-polysaccharide degrading enzymes: Status and prospects. *Comprehensive Reviews in Food Science and Food Safety*, **2020**, 19, 2767-2796	16.4	20
63	Biochemical Characterization and Substrate Degradation Mode of a Novel Agarase from. *Journal of Agricultural and Food Chemistry*, **2019**, 67, 10373-10379	5.7	8
62	Cloning, Expression, and Characterization of a Novel Thermostable and Alkaline-stable Esterase from Stenotrophomonas maltophilia OUC_Est10 Catalytically Active in Organic Solvents. *Catalysts*, **2019**, 9, 401	4	7
61	Characterization of Turbot (Scophthalmus maximus) Skin and the Extracted Acid-Soluble Collagen. *Journal of Ocean University of China*, **2019**, 18, 687-692	1	4
60	A novel autolysis system for extracellular production and direct immobilization of a phospholipase D fused with cellulose binding domain. *BMC Biotechnology*, **2019**, 19, 29	3.5	5
59	Recovery of Chitin and Protein from Shrimp Head Waste by Endogenous Enzyme Autolysis and Fermentation. *Journal of Ocean University of China*, **2019**, 18, 719-726	1	19
58	Immobilization of Phospholipase D on Silica-Coated Magnetic Nanoparticles for the Synthesis of Functional Phosphatidylserine. *Catalysts*, **2019**, 9, 361	4	9
57	Mechanism of neoagarotetraose protects against intense exercise-induced liver injury based on molecular ecological network analysis. *Bioscience, Biotechnology and Biochemistry*, **2019**, 83, 1227-1238	2.1	4
56	Agaropentaose protects SH-SY5Y cells against 6-hydroxydopamine-induced neurotoxicity through modulating NF-B and p38MAPK signaling pathways. *Journal of Functional Foods*, **2019**, 57, 222-232	5.1	8

55	Two-Step Separation of Chitin from Shrimp Shells Using Citric Acid and Deep Eutectic Solvents with the Assistance of Microwave. *Polymers*, **2019**, 11,	4.5	49
54	Efficient enzymatic hydrolysis of ionic liquid pretreated chitin and its dissolution mechanism. *Carbohydrate Polymers*, **2019**, 211, 329-335	10.3	24
53	Characterization of a Novel β-Neoagarobiose Hydrolase Capable of Preparation of Medium- and Long-Chain Agarooligosaccharides. *Frontiers in Bioengineering and Biotechnology*, **2019**, 7, 470	5.8	11
52	Conformational changes of proteins and oil molecules in fish oil/water interfaces of fish oil-in-water emulsions stabilized by bovine serum albumin. *Food Chemistry*, **2019**, 274, 402-406	8.5	11
51	Combining Cell Surface Display and DNA-Shuffling Technology for Directed Evolution of Phospholipase D and Synthesis of Phosphatidylserine. *Journal of Agricultural and Food Chemistry*, **2019**, 67, 13119-13126	5.7	6
50	Cleaner Production Guide of Chito/Chitin Oligosaccharides and Its Monomer **2019**, 107-127		3
49	Cloning, expression and characterization of a novel chitosanase from Streptomyces albolongus ATCC 27414. *Food Chemistry*, **2019**, 286, 696-702	8.5	36
48	Structure-based design of agarase AgWH50C from Agarivorans gilvus WH0801 to enhance thermostability. *Applied Microbiology and Biotechnology*, **2019**, 103, 1289-1298	5.7	7
47	Highly efficient preparation of free all-trans-astaxanthin from Haematococcus pluvialis extract by a rapid biocatalytic method based on crude extracellular enzyme extract. *International Journal of Food Science and Technology*, **2019**, 54, 376-386	3.8	2
46	Identification of a Novel Esterase from Marine Environmental Genomic DNA Libraries and Its Application in Production of Free All- trans-Astaxanthin. *Journal of Agricultural and Food Chemistry*, **2018**, 66, 2812-2821	5.7	8
45	Cloning, characterization and substrate degradation mode of a novel chitinase from Streptomyces albolongus ATCC 27414. *Food Chemistry*, **2018**, 261, 329-336	8.5	31
44	A novel agaro-oligosaccharide-lytic β-galactosidase from Agarivorans gilvus WH0801. *Applied Microbiology and Biotechnology*, **2018**, 102, 5165-5172	5.7	8
43	Discovery and Characterization of a Novel Chitosanase from Paenibacillus dendritiformis by Phylogeny-Based Enzymatic Product Specificity Prediction. *Journal of Agricultural and Food Chemistry*, **2018**, 66, 4645-4651	5.7	20
42	Effective Astaxanthin Extraction from Wet Haematococcus pluvialis Using Switchable Hydrophilicity Solvents. *ACS Sustainable Chemistry and Engineering*, **2018**, 6, 1560-1563	8.3	27
41	Reaction Specificity of Phospholipase D Prepared from Acinetobacter radioresistens a2 in Transphosphatidylation. *Lipids*, **2018**, 53, 517-526	1.6	5
40	Phosphorylated peptides from Antarctic krill (Euphausia superba) ameliorated osteoporosis by activation of osteogenesis-related MAPKs and PI3K/AKT/GSK-3β pathways in dexamethasone-treated mice. *Journal of Functional Foods*, **2018**, 47, 447-456	5.1	10
39	Coimmobilization of β-Agarase and β-Neoagarobiose Hydrolase for Enhancing the Production of 3,6-Anhydro-l-galactose. *Journal of Agricultural and Food Chemistry*, **2018**, 66, 7087-7095	5.7	9
38	Biotechnological production of zeaxanthin by microorganisms. *Trends in Food Science and Technology*, **2018**, 71, 225-234	15.3	34

37	Green and Facile Production of Chitin from Crustacean Shells Using a Natural Deep Eutectic Solvent. *Journal of Agricultural and Food Chemistry*, **2018**, 66, 11897-11901	5.7	59
36	Immobilization of Chitosanases onto Magnetic Nanoparticles to Enhance Enzyme Performance. *Catalysts*, **2018**, 8, 401	4	11
35	Multi-stage countercurrent process for extracting protein from Antarctic Krill (). *Journal of Food Science and Technology*, **2018**, 55, 4450-4457	3.3	2
34	Effective Enzyme Immobilization onto a Magnetic Chitin Nanofiber Composite. *ACS Sustainable Chemistry and Engineering*, **2018**, 6, 8118-8124	8.3	56
33	Mechanisms of DHA-enriched phospholipids in improving cognitive deficits in aged SAMP8 mice with high-fat diet. *Journal of Nutritional Biochemistry*, **2018**, 59, 64-75	6.3	27
32	Neoagarotetraose protects mice against intense exercise-induced fatigue damage by modulating gut microbial composition and function. *Molecular Nutrition and Food Research*, **2017**, 61, 1600585	5.9	46
31	Neoagaro-oligosaccharide monomers inhibit inflammation in LPS-stimulated macrophages through suppression of MAPK and NF-B pathways. *Scientific Reports*, **2017**, 7, 44252	4.9	54
30	Metabolic engineering for the microbial production of marine bioactive compounds. *Biotechnology Advances*, **2017**, 35, 1004-1021	17.8	26
29	Purification and characterization of an alkaline protease from Micrococcus sp. isolated from the South China Sea. *Journal of Ocean University of China*, **2017**, 16, 319-325	1	6
28	Whole-Cell Biocatalytic Synthesis of Cinnamyl Acetate with a Novel Esterase from the DNA Library of Acinetobacter hemolyticus. *Journal of Agricultural and Food Chemistry*, **2017**, 65, 2120-2128	5.7	22
27	Conversion of turbot skin wastes into valuable functional substances with an eco-friendly fermentation technology. *Journal of Cleaner Production*, **2017**, 156, 367-377	10.3	28
26	Identification of a novel phospholipase D with high transphosphatidylation activity and its application in synthesis of phosphatidylserine and DHA-phosphatidylserine. *Journal of Biotechnology*, **2017**, 249, 51-58	3.7	21
25	Comprehensive utilization of shrimp waste based on biotechnological methods: A review. *Journal of Cleaner Production*, **2017**, 143, 814-823	10.3	124
24	Development and application of a tyrosinase-based time-temperature indicator (TTI) for determining the quality of turbot sashimi. *Journal of Ocean University of China*, **2017**, 16, 847-854	1	7
23	Biochemical Characterization and Substrate Degradation Mode of a Novel Exotype Agarase from Agarivorans gilvus WH0801. *Journal of Agricultural and Food Chemistry*, **2017**, 65, 7982-7988	5.7	21
22	Neoagarotetraose-modulated gut microbiota and alleviated gut inflammation in antibiotic treatment mice. *Food and Agricultural Immunology*, **2017**, 28, 1408-1423	2.9	16
21	Molecular cloning and expression of a new neoagarobiose hydrolase from Agarivorans gilvus WH0801 and enzymatic production of 3,6-anhydro-l-galactose. *Biotechnology and Applied Biochemistry*, **2016**, 63, 230-7	2.8	18
20	Complete genome sequence of Agarivorans gilvus WH0801(T), an agarase-producing bacterium isolated from seaweed. *Journal of Biotechnology*, **2016**, 219, 22-3	3.7	7

19	Effect of fermentation by Aspergillus oryzae on the biochemical and sensory properties of anchovy (Engraulis japonicus) fish sauce. *International Journal of Food Science and Technology*, **2016**, 51, 133-141	3.8	21
18	The Vibrio parahaemolyticus-infecting bacteriophage qdvp001: genome sequence and endolysin with a modular structure. *Archives of Virology*, **2016**, 161, 2645-52	2.6	19
17	Astaxanthin preparation by fermentation of esters from Haematococcus pluvialis algal extracts with Stenotrophomonas species. *Biotechnology Progress*, **2016**, 32, 649-56	2.8	11
16	An environmental friendly process for Antarctic krill (Euphausia superba) utilization using fermentation technology. *Journal of Cleaner Production*, **2016**, 127, 618-623	10.3	20
15	Astaxanthin protects PC12 cells from glutamate-induced neurotoxicity through multiple signaling pathways. *Journal of Functional Foods*, **2015**, 16, 137-151	5.1	24
14	The Fermentation of Antarctic Krill Juice by a Variety of Microorganisms. *Journal of Aquatic Food Product Technology*, **2015**, 24, 824-831	1.6	3
13	Screening of microorganisms from deep-sea mud for Antarctic krill (Euphausia superba) fermentation and evaluation of the bioactive compounds. *Applied Biochemistry and Biotechnology*, **2015**, 175, 1664-77	3.2	9
12	Cloning and characterisation of a novel neoagarotetraose-forming-β-agarase, AgWH50A from Agarivorans gilvus WH0801. *Carbohydrate Research*, **2014**, 388, 147-51	2.9	31
11	Biochemical properties of fish sauce prepared using low salt, solid state fermentation with anchovy by-products. *Food Science and Biotechnology*, **2014**, 23, 1497-1506	3	15
10	Cofermentation of Bacillus licheniformis and Gluconobacter oxydans for chitin extraction from shrimp waste. *Biochemical Engineering Journal*, **2014**, 91, 10-15	4.2	42
9	Bioprocess production of sea cucumber rice wine and characterization of functional components and antioxidant activities. *Food Science and Biotechnology*, **2014**, 23, 807-814	3	1
8	Purification and characterization of two agarases from Agarivorans albus OAY02. *Process Biochemistry*, **2014**, 49, 905-912	4.8	20
7	Gene cloning, expression and characterisation of a new β-agarase, AgWH50C, producing neoagarobiose from Agarivorans gilvus WH0801. *World Journal of Microbiology and Biotechnology*, **2014**, 30, 1691-8	4.4	27
6	Antioxidant properties of bio-active substances from shrimp head fermented by Bacillus licheniformis OPL-007. *Applied Biochemistry and Biotechnology*, **2013**, 171, 1240-52	3.2	27
5	Antioxidant production and chitin recovery from shrimp head fermentation with Streptococcus thermophilus. *Food Science and Biotechnology*, **2013**, 22, 1023-1032	3	40
4	Research into the functional components and antioxidant activities of North China rice wine (Ji Mo Lao Jiu). *Food Science and Nutrition*, **2013**, 1, 307-14	3.2	7
3	A novel dextran dextrinase from Gluconobacter oxydans DSM-2003: purification and properties. *Applied Biochemistry and Biotechnology*, **2012**, 168, 1256-64	3.2	7
2	An efficient method for chitin production from crab shells by a natural deep eutectic solvent. *Marine Life Science and Technology*,1	4.5	1

1	A Carboxymethyl Chitosan-based Double-Crosslinking Hydrogel with Enhanced Antibacterial Properties for Accelerated Wound Healing. *Macromolecular Materials and Engineering*,2200060	3.9	0