



Volume 97, issue 2, 12 September 2013

ISSN 0144-8617

Editors

J.F. Kennedy

J.R. Mitchell

Associate Editors

R.A.A. Muzzarelli

M.A. Coimbra

K.J. Edgar

# Carbohydrate Polymers

SCIENTIFIC AND TECHNOLOGICAL ASPECTS OF  
INDUSTRIALLY IMPORTANT POLYSACCHARIDES

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

SciVerse ScienceDirect



Vol. 97, issue 2, 12 September 2013

## CONTENTS

(Abstracted/indexed in: BIOSIS (Biological Abstracts); Chemical Abstracts; Current Contents/Agriculture, Biology, Environmental Sciences; Engineering Index; Food Science and Technology Abstracts; Polymer Contents; Process and Chemical Engineering; Science Citation Index; SciSearch; Theoretical Chemical Engineering). Also covered in the abstract and citation database SCOPUS®. Full text available on ScienceDirect®.

- 253 A new method for rapid determination of carbohydrate and total carbon concentrations using UV spectrophotometry  
A.A. ALBALASMEH, A.A. BERHE, T.A. GHEZZEHEI (USA)
- 262 Preparation and characterization of chitosan/HP- $\beta$ -cyclodextrins composites with high sorption capacity for carvacrol  
L. HIGUERAS, G. LÓPEZ-CARBALLO, J.P. CERISUELO, R. GAVARA, P. HERNÁNDEZ-MUÑOZ (Spain)
- 269 Fracture behavior of a commercial starch/polycaprolactone blend reinforced with different layered silicates  
E. PÉREZ, C.J. PÉREZ, V.A. ALVAREZ, C. BERNAL (Argentina)
- 277 Preparation and characterization of oligochitosan–tragacanth nanoparticles as a novel gene carrier  
A. FATTAHI, K. SADRJAVADI, M.A. GOLOZAR, J. VARSHOSAZ, M.-H. FATHI, H. MIRMOHAMMAD-SADEGHI (Iran)
- 284 The properties of chitosan complexes with smooth and rough forms of lipopolysaccharides on CHO-K1 cells  
M. ARABSKIA, H. LISOWSKA, A. LANKOFF (Poland), V.N. DAVYDOVA (Russia), Z. DRULIS-KAWA, D. AUGUSTYNIAK (Poland), I.M. YERMAK (Russia), A. MOLINARO (Italy), W. KACA (Poland)
- 293 Preparation and structural elucidation of a glucomannogalactan from marine fungus *Penicillium commune*  
Y. CHEN, W. MAO, J. WANG, W. ZHU, C. ZHAO, N. LI, C. WANG, M. YAN, T. GUO, X. LIU (People's Republic of China)
- 300 High tenacity regenerated chitosan fibers prepared by using the binary ionic liquid solvent (Gly-HCl)-[Bmim]Cl  
B. MA, A. QIN, X. LI, C. HE (PR China)
- 306 Influence of waxy rice flour substitution for wheat flour on characteristics of batter and freeze-thawed cake  
N. JONGSUTJARITAM, S. CHAROENREIN (Thailand)
- 315 Biodegradation of thermoplastic starch/eggshell powder composites  
M. BOOTKLAD, K. KAEWTATIP (Thailand)
- 321 Hyaluronan derivatives: Alkyl chain length boosts viscoelastic behavior to depolymerization  
M. PAVAN, D. GALESSO, G. MENON, D. RENIER, C. GUARISE (Italy)
- 327 Highly luminescent chitosan-L-cysteine functionalized CdTe quantum dots film: Synthesis and characterization  
H. KUMAR, R. SRIVASTAVA, P.K. DUTTA (India)
- 335 Influence of low methoxyl pectin gel textures and *in vitro* release of rutin from calcium pectinate beads  
P. JANTRAWUT (Thailand), A. ASSIFAOU, O. CHAMBIN (France)
- 343 Effect of mineral elements on physicochemical properties of oxidised starches and generation of free radicals  
S. PIETRZYK, T. FORTUNA, K. KRÓLIKOWSKA, E. ROGOZIŃSKA, M. ŁABANOWSKA, M. KURDZIEL (Poland)
- 352 Orange oil stability in spray dry delivery systems  
A. SUBRAMANIAM, R.L. VEAZEY, A. SCHOBER, A. RADA, Y. RONG, R.M.T. VAN SLEEUWEN, R. GOLDING, S. ZHANG, V. NORMAND (USA)
- 358 Preparation of low molecular weight fucoidan by gamma-irradiation and its anticancer activity  
J.-I. CHOI, H.-J. KIM (South Korea)
- 363 Simple preparation of chitosan nanofibers from dry chitosan powder by the Star Burst system  
A.K. DUTTA, N. KAWAMOTO, G. SUGINO, H. IZAWA, M. MORIMOTO, H. SAIMOTO, S. IFUKU (Japan)
- 368 The influence of the primary and secondary xanthan structure on the enzymatic hydrolysis of the xanthan backbone  
M.M. KOOL, H.A. SCHOLS, R.J.B.M. DELAHAÏJE (The Netherlands), G. SWORN (France), P.A. WIERENGA, H. GRUPPEN (The Netherlands)
- 376 A practical optimization on salt/high-methoxyl pectin interaction to design a stable formulation for Doogh  
H. JOUDAKI, M. MOUSAVI, M. SAFARI, S.H. RAZAVI, Z. EMAM-DJOMEH, S.M.T. GHARIBZAHEDI (Iran)
- 384 <sup>1</sup>H and <sup>13</sup>C chemical shift assignment of the monomers that comprise carboxymethyl cellulose  
H. KONO (Japan)
- 391 Green synthesis of silver nanoparticles using 4-acetamido-TEMPO-oxidized curdlan  
J.-K. YAN, P.-F. CAI, X.-Q. CAO, H.-L. MA, Q. ZHANG, N.-Z. HU, Y.-Z. ZHAO (China)
- 398 Characterization of polysaccharides from *Ganoderma* spp. using saccharide mapping  
D.-T. WU, J. XIE, D.-J. HU, J. ZHAO, S.-P. LI (Macao)

- 406 <sup>1</sup>H NMR studies of starch–water interactions during microwave heating  
D. FAN, S. MA, L. WANG, H. ZHAO, J. ZHAO, H. ZHANG, W. CHEN (China)
- 413 Stability of (1 → 3)-β-polyglucuronic acid under various pH and temperature conditions  
E. WATANABE, N. TAMURA, S. FUJISAWA, T. SAITO, N. HABU, A. ISOGAI (Japan)
- 421 Synthesis and characterization of pullulan-mediated silver nanoparticles and its antimicrobial activities  
P. KANMANI, S.T. LIM (South Korea)
- 429 Superabsorbent nanocomposite hydrogels made of carboxylated cellulose nanofibrils and CMC-g-p(AA-co-AM)  
Y. ZHOU, S. FU, L. ZHANG, H. ZHAN (China)
- 436 The influence of amylose-LPC complex formation on the susceptibility of wheat starch to amylase  
S. AHMADI-ABHARI, A.J.J. WOORTMAN, A.A.C.M. OUDHUIS, R.J. HAMER, K. LOOS (The Netherlands)
- 441 Single step coupling for multi-responsive water-based chitin/chitosan magnetic nanoparticles  
S. CHATRABHUTI, S. CHIRACHANCHAI (Thailand)
- 451 Application of chitosan as an adsorbent to treat rice mill wastewater—Mechanism, modelling and optimization  
K. THIRUGNANASAMBANDHAM, V. SIVAKUMAR, J. PRAKASH MARAN (India)
- 458 Structural variability between starch granules in wild type and in *ae* high-amylose mutant maize kernels  
D. LIU (PR CHINA), M.L. PARKER, N. WELLNER, A.R. KIRBY, K. CROSS, V.J. MORRIS (UK), F. CHENG (PR China)
- 469 Preparation of chitin nanogels containing nickel nanoparticles  
N.A. KUMAR, N.S. REJINOLD, P. ANJALI, A. BALAKRISHNAN, R. BISWAS, R. JAYAKUMAR (India)
- 475 Characterization of internal structure of maize starch without amylose and amylopectin separation  
F. ZHU, E. BERTOFT, K. SEETHARAMAN (Canada)
- 482 Physicochemical properties and starch digestibility of *Scirpus grossus* flour and starch  
C. LERDLUKSAMEE, K. SRIKAE0 (Thailand), J.A.M. TUTUSAUS, J.G. DIÉGUEZ (Spain)
- 489 Spray drying: Thermodynamics and Operating Conditions  
V. NORMAND, A. SUBRAMANIAM, J. DONNELLY (USA), P.-E. BOUQUERAND (Geneva)
- 496 A novel biodegradable β-cyclodextrin-based hydrogel for the removal of heavy metal ions  
Z. HUANG (China and USA), Q. WU (USA), S. LIU, T. LIU, B. ZHANG (China)
- 502 Hydration properties and phosphorous speciation in native, gelatinized and enzymatically modified potato starch analyzed by solid-state MAS NMR  
F.H. LARSEN, M.M. KASPRZAK, H.N. LÆRKE, K.E.B. KNUDSEN, S. PEDERSEN, A.S. JØRGENSEN, A. BLENNOW (Denmark)
- 512 The effect of partial gelatinization of corn starch on its retrogradation  
Z.-Q. FU, L.-J. WANG, D. LI, Y.-G. ZHOU (China), B. ADHIKARI (Australia)
- 518 Hydrolysis of hemicellulose to produce fermentable monosaccharides by plasma acid  
Y. WANG, B. YUAN, Y. JI, H. LI (China)
- 523 Immobilization of pectinase on oxidized pulp fiber and its application in whitewater treatment  
R. WU, B.-H. HE, G.-L. ZHAO, L.-Y. QIAN, X.-F. LI (China)
- 530 Synthesis of ethylenediamine modified chitosan and evaluation for removal of divalent metal ions  
P.D. CHETHAN, B. VISHALAKSHI (India)
- 537 Functionalization of linen/cotton pigment prints using inorganic nano structure materials  
N.A. IBAHIM, B.M. EID, E. ABD EL-AZIZ, T.M. ABOU ELMAATY (Egypt)
- 546 β-Cyclodextrin as the suitable molecular container for isopulegol enantiomers  
M. CEBORSKA, K. SZWED, K. SUWINSKA (Poland)
- 551 Properties of retrograded and acetylated starch produced via starch extrusion or starch hydrolysis with pullulanase  
M. KAPELKO, T. ZIĘBA, A. GRYSZKIN, M. STYCZYŃSKA, A. WILCZAK (Poland)
- 558 Classification and kinetic analysis of viscosity growth processes for NaOH-gelatinized rice starches  
H. YAMAMOTO, N. SAWAI, K. SEO (Japan)
- 565 KGM and PMAA based pH-sensitive interpenetrating polymer network hydrogel for controlled drug release  
Q. XU, W. HUANG, L. JIANG, Z. LEI, X. LI, H. DENG (China)
- 571 Understanding the role of plasticisers in spray-dried starch  
M.B.K. NIAZI (PAKISTAN), M. ZIJLSTRA, A.A. BROEKHUIS (The Netherlands)
- 581 Assessing cellulose microfibrillar structure changes due to cellulase action  
T. JEOH, M.C. SANTA-MARIA, P.J. O'DELL (USA)
- 587 Anionic carbohydrate-containing chitosan scaffolds for bone regeneration  
H. PARK, B. CHOI, J. NGUYEN, J. FAN, S. SHAFI, P. KLOKKEVOLD, M. LEE (USA)
- 597 Graft (partially carboxymethylated guar gum-g-poly vinyl sulfonic acid) copolymer: From synthesis to applications  
M. YADAV, A. SRIVASTAV, S.K. VERMA, K. BEHARI (India)
- 604 Characterization of polysaccharides with marked inhibitory effect on lipid accumulation in *Pleurotus eryngii*  
J. CHEN, Y. YONG, M. XING, Y. GU, Z. ZHANG, S. ZHANG, L. LU (China)
- 614 Formation of resistant corn starches induced by gamma-irradiation  
J.-S. LEE, M.-L. EE, K.-H. CHUNG, Z. OTHMAN (Malaysia)
- 618 Osteoblast differentiation and phenotype expressions on chitosan-coated Ti-6Al-4V  
H.-Y. LIN, J.-H. CHEN (Taiwan)
- 627 Optimization of a bioactive exopolysaccharide production from endophytic *Fusarium solani* SD5  
S. MAHAPATRA, D. BANERJEE (India)
- 635 Dextran-based cyclodextrin polymers: Their solubilizing effect and self-association  
Z. FÜLÖP (Iceland), T.T. NIELSEN, K.L. LARSEN (Denmark), T. LOFTSSON (Iceland)
- 643 Mineralized cyclodextrin nanoparticles for sustained protein delivery  
M. SIVASUBRAMANIAN, T. THAMBI, J.H. PARK (Republic of Korea)



- 650 Insights into the nanostructure of low-methoxyl pectin–calcium gels  
I. VENTURA, J. JAMMAL, H. BIANCO-PELED (Israel)
- 659 Structural elucidation of polysaccharide fractions from brown seaweed *Sargassum pallidum*  
H. YE, C. ZHOU, W. LI, B. HU, X. WANG, X. ZENG (PR China)
- 665 Effects of relative humidity and ionic liquids on the water content and glass transition of plasticized starch  
A. BENDAOU, Y. CHALAMET (France)
- 676 Synthesis and preliminary cellular evaluation of phosphonium chitosan derivatives as novel non-viral vector  
C. QIAN, X. XU, Y. SHEN, Y. LI, S. GUO (China)
- 684 Ultrasonic-assisted preparation of a low molecular weight heparin (LMWH) with anticoagulant activity  
O. ACHOUR, N. BRIDIAU, A. GODHBANI, F. LE JOUBIQUX, S.B. JUCHEREAU, F. SANNIER, J.-M. PIOT, I.F. ARNAUDIN, T. MAUGARD (France)
- 690 Phosphorylation and anti-tumor activity of exopolysaccharide from *Lachnum* YM120  
M. YE, R.-Y. YUAN, Y.-L. HE, Z.-Z. DU, X.-J. MA (China)
- 695 Extraction of cellulose nanofibrils from dry softwood pulp using high shear homogenization  
J. ZHAO, W. ZHANG (China), X. ZHANG (Georgia), X. ZHANG, C. LU (China), Y. DENG (Georgia)
- 703 Optimization of microwave assisted extraction of pectin from orange peel  
J.P. MARAN, V. SIVAKUMAR, K. THIRUGNANASAMBANDHAM, R. SRIDHAR (India)
- 710 The *in vitro* immunomodulatory activity of a polysaccharide isolated from *Kadsura marmorata*  
H. WANG, X. DENG, T. ZHOU, C. WANG, Y. HOU, H. JIANG (PR China), G. LIU (USA)
- 716 (1 → 3)-β-D-Glucan reduces the damages caused by reactive oxygen species induced in human platelets by lipopolysaccharides  
J. SALUK, M. BIJAK, M.B. PONCZEK, P. NOWAK, B. WACHOWICZ (Poland)
- 725 Comparative effect of mechanical beating and nanofibrillation of cellulose on paper properties made from bagasse and softwood pulps  
E. AFRA, H. YOUSEFI, M.M. HADILAM (Iran), T. NISHINO (Japan)
- 731 Burdock fructooligosaccharide induces stomatal closure in *Pisum sativum*  
Y. GUO, M. GUO, W. ZHAO, K. CHEN, P. ZHANG (China)
- 736 Optimum extraction of polysaccharides from *Opuntia dillenii* and evaluation of its antioxidant activities  
Q. YANG, H. CHEN, X. ZHOU (PR China), J. ZHANG (Canada)
- 743 Synthesis and characterization of ion-imprinted resin based on carboxymethyl cellulose for selective removal of  $UO_2^{2+}$   
M. MONIER, D.A. ABDEL-LATIF (Egypt)
- 753 Mussel-inspired modification of dextran for protein-resistant coatings of titanium oxide  
J.Y. PARK, J.S. KIM, Y.S. NAM (Republic of Korea)
- 758 Synthesis of thermal and chemical resistant oxygen barrier starch with reinforcement of nano silicon carbide  
S. DASH, S.K. SWAIN (India)
- 764 Effects of autoclaving temperature and storing time on resistant starch formation and its functional and physicochemical properties  
A.N. DUNDAR, D. GOCMEN (Turkey)
- 772 Dose–response efficacy and long-term effect of the hypocholesterolemic effect of octadecylpectinamide in rats  
M. MAROUNEK, Z. VOLEK, D. DUŠKOVÁ, J. TURINGMA, T. TAUBNER (Czech Republic)
- 776 Influence of the physico-chemical characteristics of chito-oligosaccharides (COS) on antioxidant activity  
M. MENGÍBAR, I. MATEOS-APARICIO, B. MIRALLES, Á. HERAS (Spain)
- 783 Multifunctional finishing of cellulosic/polyester blended fabrics  
N.A. IBRAHIM, B.M. EID, M.A. YOUSSEF, H.M. IBRAHIM, H.A. AMEEN, A.M. SALAH (Egypt)
- 794 Determination of the carbohydrates from *Notopterygium forbesii* Boiss by HPLC with fluorescence detection  
S. ZHANG, C. LI, G. ZHOU, G. CHE, J. YOU, Y. SUO (PR China)
- 800 Polysaccharides from *Rhizopus nigricans* mycelia induced apoptosis and G2/M arrest in BGC-823 cells  
G. CHEN, P. ZHANG, T. HUANG, W. YU, J. LIN, P. LI, K. CHEN (China)
- 809 Sorption of carbamazepine from water by magnetic molecularly imprinted polymers based on chitosan- $Fe_3O_4$   
Y.-L. ZHANG, J. ZHANG, C.-M. DAI, X.-F. ZHOU, S.-G. LIU (China)
- 817 Soluble soybean polysaccharide: A new carbohydrate to make a biodegradable film for sustainable green packaging  
S. TAJIK, Y. MAGHSOUDLOU, F. KHODAIYAN, S.M. JAFARI, M. GHASEMLOU, M. AALAMI (Iran)
- 825 Binary PVA bio-nanocomposites containing cellulose nanocrystals extracted from different natural sources: Part I  
E. FORTUNATI, D. PUGLIA, F. LUZI, C. SANTULLI (Italy), J.M. KENNY (Italy, Spain), L. TORRE (Italy)
- 837 Ternary PVA nanocomposites containing cellulose nanocrystals from different sources and silver particles: Part II  
E. FORTUNATI, F. LUZI, D. PUGLIA, A. TEREZI, M. VERCELLINO, L. VISAI, C. SANTULLI, L. TORRE (Italy), J.M. KENNY (Italy, Spain)
- 849 Antioxidant activity of phosphorylated exopolysaccharide produced by *Lactococcus lactis* subsp. *lactis*  
Y. GUO, D. PAN, Y. SUN, L. XIN, H. LI, X. ZENG (China)
- 855 Corrigendum to “Optical, bactericidal and water repellent properties of electrospun nano-composite membranes of cellulose acetate and ZnO” [Carbohydr. Polym. 87 (2012) 1065–1072]  
S. ANITHA, B. BRABU, D.J. THIRUVADIGAL, C. GOPALAKRISHNAN, T.S. NATARAJAN (India)
- 856 Optical, bactericidal and water repellent properties of electrospun nano-composite membranes of cellulose acetate and ZnO  
S. ANITHA, B. BRABU, D.J. THIRUVADIGAL, C. GOPALAKRISHNAN, T.S. NATARAJAN (India)
- 864 Corrigendum to “Structure of arabinogalactan-protein from Acacia gum: From porous ellipsoids to supramolecular architectures” [Carbohydr. Polym. 90 (2012) 322–332]  
D. RENARD, C. GARNIER, A. LAPP (France), C. SCHMITT (Switzerland), C. SANCHEZ (France)