european chitin society

NEWSLETTER

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Message from the President

In a few years from now we will celebrate the second centenary of the seminal *Mémoire sur la composition chimique des parties cornées des insectes* in which the French chemist Auguste Odier presented to the learned community his newly discovered *chitine*.

Shortly the European and Latinoamerican societies on Chitin and Chitosan will meet in The XIII-EUCHIS – VIII SIAQ 2017 Conference in Seville to review the state of the art of research and applications in the field (http://chitin2017.com)

Max Planck had written that "Scientific discovery and scientific knowledge have been achieved only by those who have gone in pursuit of it without any practical purpose whatsoever in view", wich is absolutely true, but we are descendants of generations of researchers, we are building upon their discoveries and therefore we should value their contributions trying to bring them a bit further, but trying also to draw applications from their scientific insights.

The aforementioned Conference will intend to cope at the same time with the two goals because we are scientists of the XXI century and we should not lose sight of our activity, namely R&D, research and development.

This is the reason why we will put together scientists and industrialists. After all, "Roughly, science is the mode of cognition of industrial society, and industry is the ecology of science", as the philosopher Ernest André Gellner wrote thirty years after Max Planck.

Angeles Heras Caballero.

EUCHIS President

Editorial

At the beginning of 2017, we convey greetings and our best wishes to all members of EUCHIS. This New Year marks the most important event of our Society, i.e. the 13th International conference, EUCHIS 2017, organized jointly with 8th SIAQ of the Iberoamerican Chitin Society by Angeles Heras and her team in Seville, Spain. Please visit: http://chitin2017.com. We hope to see you all in Seville !

A survey of EUCHIS members research activities is in the focus of this Newsletter, including abstracts of seven papers, presented at 12th EUCHIS, Münster, Germany, Aug. 30 – Sept. 2, 2015, and now published as peer reviewed full articles in a special issue of *Pure and Applied Chemistry*. Thanks to Profs. Bruno Mörschbacher and to Francisco Goycoolea for coordinating this and arranging for speedy publication !

The 2016 bibliography of EUCHIS member's is based on data retrieved from Science Finder®, including Medline, on November 20, 2016. It contains a few citations of papers not dealing with chitin or chitosan and reflects a broad range of research topics and activities of our members. We will continue this survey in biannual intervals. Missing your name or any citation ? Please contact Martin.Peter@uni-potsdam.de, and we will include it in the next Newsletter.

A survey of memberships shows presently 69 members, but only 26 duly paid so far for 2016 (+ seven donors). Two new members joined EUCHIS in 2016. Unfortunately, 83 names had to be deleted from the directory, because of cancellations, overdue membership subscription or invalid postal or e-mail address. Please contact Martin Peter when you are not sure whether your membership was cancelled, but you wish be reassured about your member status.

The Braconnot Prize shall be awarded during EUCHIS 2017. According to the rules, selection of the recipient, who must be a member of EUCHIS, "is made on the basis of the doctoral/PhD thesis which has been published in an international, peer-reviewed journal in the last three years (the applicant must be the first author of the paper), and which is also announced in the EUCHIS Newsletter". For more information on the Braconnot Prize, see www.euchis.org. Any applicant or her/his supervisor should send the abstract of the paper to the secretary until April 15, in order to include it in the next Newsletter which shall be distributed early May.

We wish you all a peaceful, prosperous New Year, good health and personal as well as professional success and rewards!

Svetlana Bratskaya, Secretary
Martin G. Peter, Assistant Secretary

EUCHIS 2015

Abstracts of Papers published in Pure and Applied Chemistry

Moerschbacher, B. M., Goycoolea, F. M., **12th International Conference of the European Chitin Society and 13th International Conference on Chitin and Chitosan (EUCHIS/ICCC 2015).** *Pure Appl. Chem.*, (2016) **88**, 841-842; http://dx.doi.org/10.1515/pac-2016-1004.

Tsai, C.-W., Young, T.-H., **CD44 expression trends of mesenchymal stem-derived cell, cancer cell and fibroblast spheroids on chitosan-coated surfaces.** *Pure Appl. Chem.*, (2016) **88**, 843-852; http://dx.doi.org/10.1515/pac-2016-0405.
CD44, a cell-surface glycoprotein, plays an important role in cell proliferation, adhesion, migration, and other biol. functions, which are related with the physiol. and pathol. activities of cells. Esp., CD44 is extensively expressed within adult bone marrow and has been considered as an important marker for some cancer stem cells (CSCs) in various types of tumors. Therefore, it is essential to understand the variations in CD44 expression of stem cells and cancer cells for further clin. applications. In this paper, CD44 expression was assessed on a human colon cancer cell line (SW620), a human mesenchymal stem-like cell line (3A6), and a human foreskin fibroblast line (Hs68). We used chitosan to establish a suspension culture model to develop multicellular spheroids to mimic a three-dimension (3D) in vivo environment. Obviously, CD44 expression on 3A6 and SW620 cells was dynamic and diverse when they were in the aggregated state suspended on chitosan, while Hs68 cells were relatively stable. Furthermore, we discuss how to regulate CD44 expression of 3A6 and SW620 cells by the interactions between cell and cell, cell and chitosan, as well as cell and microenvironment. Finally, the possible mechanism of chitosan to control CD44 expression of cells is proposed, which may lead to the careful use of chitosan for potential clin. applications.

Prashanth, K. V. H., Baskaran, R., DhanyaSri, E. B., Rajashekaramurthy, **Bioactive chitosan based coatings: functional applications in shelf life extension of Alphonso mango - a sweet story.** *Pure Appl. Chem.*, (2016) **88**, 853-863; http://dx.doi.org/10.1515/pac-2016-0704.
Chitosan-based coating (M4F2) was used successfully to delay ripening and prolong shelf-life of rapidly perishable and expensive Alphonso mango fruits stored at 30 ± 3°C and 40-50% RH for 15 days. Matured raw Alphonso mango fruits were simple dip treated/coated and air dried with our newly developed chitosan based formulation (for industry) with additives. Samples were taken at regular intervals for routine anal. of fruits. Results indicated that M4F2 coating could decrease the decay incidence loss along with delay the change in color of mango fruit during storage but not physiol. steady wt. loss. Interestingly, sensory evaluation indicated that quality of mango was enhanced slight significantly to more sweetness and better aroma by M4F2 coating compared to uncoated control fruits. Further, our M4F2 coating formulation may act as an important potentiator of flavor compds. of mango as well as controlling org. acids and sugars, which are key components in the perception of mango flavor. Understanding the chem. components that contribute to flavor perception of the fruit is necessary for post-harvest storage technol. This information is also important to study chitosan/derivs. elicitation in mol. level to improve mango flavor as well as in identification of genes responsible for flavor quality. The scientific story behind this effective chitosan based coating formulation development has been discussed..

Tegl, G., Oehlknecht, C., Vielnascher, R., Kosma, P., Hofinger-Horvath, A., Guebitz, G. M., **Commercial cellulases from Trichoderma longibrachiatum enable a large-scale production of chito-oligosaccharides.** *Pure Appl. Chem.*, (2016) **88**, 865-872; http://dx.doi.org/10.1515/pac-2016-0703.
Chito-oligosaccharides (COSs) are a substance class of high interest due to various beneficial bioactive properties. However, detailed mechanistic and application-related investigations are limited due to the poor availability of COSs with defined structural properties. Here, we present the large-scale prodn. of COSs with defined degree of N-acetylation using a com. cellulase prepn. from Trichoderma longibrachiatum. The enzyme prepn. was found to exclusively produce COSs lacking of acetyl groups while MS/MS anal. indicated a cellobiohydrolase to be the responsible for hydrolysis with the enzyme prepn. MS and NMR anal. proved the low content of acetyl groups in the COS mix and oligomers with a d.p. (DP) of 2-6 were obtained. The low cost enzyme source was further exploited for large-scale prodn. in a 20 g batch and resulted a COSs yield of 40%. An inexpensive enzyme source for the prodn. of bioactive COSs was successfully implemented and thorough product anal. resulted in well-defined COSs. This strategy could improve the access to this substance class for a more detailed investigation of its various biol. activities.

Vasilieva, T., Lopatin, S., Varlamov, V., Miasnikov, V., Hein, A. M., Vasiliev, M., **Hydrolysis of chitin and chitosan in low temperature electron-beam plasma.** *Pure Appl. Chem.*, (2016) **88**, 873-879; http://dx.doi.org/10.1515/pac-2016-0603.

Hydrolysis of natural chitin and chitosans was performed in the electron beam plasma (EBP) of oxygen, by means of specially designed electron beam plasmachem. reactor (EBPR). Low mol. water-sol. chitin oligosaccharides with wt.-av. mol. mass 800-2000 Da and polydispersion index 1.5-2.5 were produced due to action of active oxygen species formed in the EBP. By optimizing the treatment conditions the 95% yield of chitin oligosaccharides was obtained after 2 min whereas the conventional chem. hydrolysis usually takes several days. The studies of the antimicrobial activity of low mol. products formed due to EBP-stimulated degrdn. showed that they inhibit the multiplication of various mycelial and yeast-like fungi. The technique involved is likely to be promising for the prodn. of bioactive low mol. chitin oligosaccharides and the EBP-stimulated hydrolysis appears to be competitive with technologies conventionally used in the industry.

Goni, O., Quille, P., O'Connell, S., **Production of chitosan oligosaccharides for inclusion in a plant biostimulant.** *Pure Appl. Chem.*, (2016) **88**, 881-889; http://dx.doi.org/10.1515/pac-2016-0701.
The use of biostimulants to enhance crop productivity is beginning to be adopted into mainstream agricultural practice. There is an emerging consensus on the crit. role that low-cost and scalable chitosan oligosaccharide prodn. systems can play in meeting the demands of this "greener" approach in agriculture. The objective of our research was to produce chitosan oligosaccharides (CHOS) mixts. that can work as plant biostimulants using cost effective enzymes. Com. chitosans with a consistent formulation and available in bulk were used in the study. Chitosans were characterized in terms of degree of N-acetylation (pH-metric titrn.) and mol. wt. (Ubbelohde viscometer). The yield of the CHOS were detd. along with their physicochem. characteristics. The biol. activity of the different CHOS mixts. were evaluated for efficacy against a fungal pathogen (F. oxysporum) in the susceptible tomato cultivar 'Moneymaker'. The performance of some CHOS resulted in significant enhancements in a no. of plant health indicators such as increased biomass, disease control and induction of ISR markers. Finally, the optimal CHOS prepn. in terms of plant bioactivity was scaled up and validated by a preliminary field trial with the industrial tomato cultivar 'H9661'. The effectiveness of this treatment on crop productivity was consistent with the results obsd. in the lab and similar to other com. plant biostimulants..

Hoffmann, S., Fuenzalida Werner, J. P., Moreno-Villoslada, I., Goycoolea, F. M., **New insights into the nature of the Cibacron brilliant red 3B-A - Chitosan interaction.** *Pure Appl. Chem.*, (2016) **88**, 891-904; http://dx.doi.org/10.1515/pac-2016-0712.
Cibacron brilliant red 3B-A (CBR) has been introduced to det. chitosan (CS) concns. in soln., and several studies applied it to measure chitosan content in pharmaceutical formulations. So far, studies have relied on the absorbance band shift to 570 nm to det. the extent of the CBR - CS interaction. In this study, we show that CBR forms micro- to nanometer sized aggregates with CS, depending on their charge ratio and that other photophys. changes in CBR are induced by this interaction. We found that, besides the bathochromic band shift, aggregation induces emission at 600 nm and emission quenching at 360 nm. We compared changes CS induced in absorbance and fluorescence emission of CBR with the CS monomer glucosamine and poly(allylamine) hydrochloride, which both contain amino groups, and found that similar but less intense photophys. changes also occur. Furthermore, CS-induced CD in CBR suggests a twisted, chiral structure of these aggregates that should match with the previously published in silico simulations of the structure of CS in soln. The low linear charge d. of CS and its chiral conformation are considered responsible for the enhanced photophys. response of CBR interacting with the polycation..

Mendes, A. C., Shekarforoush, E., Engwer, C., Beeren, S. R., Gorzelanny, C., Goycoolea, F. M., Chronakis, I. S., **Co-assembly of chitosan and phospholipids into hybrid hydrogels.** *Pure Appl. Chem.*, (2016) **88**, 905-916; http://dx.doi.org/10.1515/pac-2016-0708.
Novel hybrid hydrogels were formed by adding chitosan (Ch) to phospholipids (P) self-assembled particles in lactic acid. The effect of the phospholipid concn. on the hydrogel properties was investigated and was obsd. to affect the rate of hydrogel formation and viscoelastic properties. A lower concn. of phospholipids (0.5% wt/v) in the mixt., facilitates faster network formation as obsd. by Dynamic Light Scattering, with lower elastic modulus than the hydrogels formed with higher phospholipid content. The nano-porous structure of Ch/P hydrogels, with a diam. of 260±20 nm, as obsd. by cryo-SEM, facilitated the penetration of water and swelling. Cell studies revealed suitable biocompatibility of the Ch/P hydrogels that can be used within life sciences applications.

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182. Pestov, A.V., ***Bratskaya***, S.Y. **Method for obtaining granules of cross-linked chitosan.** RU2590982C1, 2016.

183. Samuylenko, A.Y., Melnik, N.V., Levkovich, N.G., Barsukov, Y.I., Makarova, L.I., Melnik, R.N., Grin, S.A., ***Albulov***, A.I., Susskii, E.V., Yartsev, S.N. **Vaccine for animal necrobacteriosis prevention and its manufacturing method.** RU2590596C1, 2016.

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Member Statistics 2016

	active	associate	collective	donor	student	
Austria					1	
Belgium				1		
Brazil		1				
Czech Republic	1					
France	1		1	2	4	
Germany	13			2	2	
India		1			1	
Italy	3					
Mexico					3	
Norway	3				2	
Oman					1	
Poland	3				1	
Portugal	1					
Russia	6					
South Africa		1				
Spain	5		1		1	
Sweden	1		1			
Turkey	1			1		
U.K.				1		
Total	**38**	**3**	**3**	**7**	**16**	
						67

New Members 2016

	associate	collective
Switzerland		1
unknown	1	

Cancelled or invalid address and/or Membership subscription due for more than three years

Algeria	1
Argentina	1
Austria	1
Belgium	2
Brasil	2
Canada	4
Czech Republic	2
France	5
Germany	12
Greece	1
India	2
Indonesia	1
Ireland	1
Italy	1
Japan	1

Mexico	1
Norway	6
Poland	4
Portugal	11
Russia	2
Spain	7
Sweden	2
Switzerland	4
Thailand	2
The Netherlands	3
Turkey	3
U.S.A.	1
Total	**83**

Events

- **EUCHIS/ SIAQ 2017**, Seville, Spain, **May 31st – June 3rd, 2017**
  organized under the patronages of the European Chitin Society (EUCHIS) and the Iberoamerican Chitin Society (SIAQ),
  URL: http://chitin2017.com

- **19th EUROCARB,** Barcelona, Spain, **July 2nd-6th, 2017,** hosted by the Institut Químic de Sarrià, University Ramon Llull, under the auspices of the European Carbohydrate Organization,
  http://www.eurocarb2017.com/

- **14th ICCC / 12th APCCS** (International Chitin-Chitosan Conference / Asian-Pacific Chitin- Chitosan Symposium). 2018, **Osaka**, Japan.