

## ***Novel CD-based supramolecular multifunctional systems***

### ***Report on EuroCD European Cyclodextrin Conference Oct. 6-9, 2015, Lille***

The conference organized by the French Cyclodextrin Society, Bernard Martel, Sophie Fourmentin and Eric Monflier was a significant event with 170 participants from 4 continents. The 9 invited, 37 oral, 18 flash presentations and 66 posters covered various fields of cyclodextrin research and applications. Most of the presentations, however, focused on pharmaceutical applications.

As much as 18 of the 84 posters were selected by the organizing committee for flash presentation as a novel form of presentation introduced to the CD conferences here. The authors got the possibility to show their main results in 5-minute talks without discussion. The **Best Flash Presentation prize** was awarded to Annika Heel and Hartwig Steckel for the demonstration of the hot-melt extrusion process in the preparation of itraconazole/BCD complex [1]. Granulate-like, amorphous product was obtained showing that at industrial scales this easily up-scalable technology could substitute kneading.

The **Best Poster Prize** was won by Georgios Miliotis *et al.* The poster showed that anionic EDTA-type CDs having chelating properties toward metal cations were able to inhibit metallo- $\beta$ -lactamases, the enzymes responsible for antibiotic resistance of Gram-negative bacteria [2]. *In vitro* studies proved that these EDTA-type CDs significantly enhanced antimicrobial activity of the antibiotic imipenem against metallo- $\beta$ -lactamase-producing *K. pneumonia*.

The present issue of the Cyclodextrin News contains the keywords of all the presentations of the EuroCD conference. The leading topic was still the pharmaceutical application: the half of the presentations belong to this category (48%). Synthesis of novel CD derivatives and CD-grafted polymers, etc. (19%), studying the complex formation of non-pharmaceutical guest molecules (13%), industrial applications including catalysis and environmental use (10%), food applications (5%), sensors and analytical applications (4%) follow in this order. Interestingly the effect of various CDs on the cell membrane and other cell organelles, very widely studied earlier was hardly represented.

The preparation and characterization of various supramolecular multifunctional systems mainly for drug delivery seemed to be in the focus. Some examples are listed below.

CD nanoparticles with intrinsic apoptotic effects on MCF-7 human breast cancer cell line were prepared by nanoprecipitation method using anionic (6OCapro BCD) and polycationic (BCDC6) amphiphilic CDs [3]. Combined with paclitaxel synergic effect of anticancer drugs with apoptosis induced by the carrier was observed.

An innovative method for compaction of DNA using host-guest interaction was demonstrated [4]. Adamantyl moiety was attached to the cationic CD with a spacer short enough to hinder the self-complexation. The forming cationic supramolecular polymer can interact with DNA.

Another group synthesized Pluronic-based, cholesterol end-capped cationic polyrotaxanes (PR<sup>+</sup>) threaded with HPBCD for efficient and safe delivery of siRNA [5]. The cholesterol moieties help the nanoparticle to enter into the cell. The more compact PR<sup>+</sup>:siRNA polyplex formulations produce improved silencing efficiency compared to Lipofectamine 2000.

Various self-assembled nanoparticles were presented.

Jun Li gave an excellent summary on the supramolecular functional polymers including supramolecular hydrogels for gene delivery. Vesicular nanostructures based on amphiphilic star-block copolymers with adamantyl end-group interacted with dimethyl-BCD and were useful in cancer therapy, as well as multifunctional hybrid nano-carrier utilized for simultaneous dual therapeutics delivery and cellular imaging, etc. [6].

The preparation of stimuli-responsive hollow nanocapsules by self-assembly of complementary polymers containing guest moieties (ferrocene or azobenzene) and cyclodextrin units was reported [7]. Substituted dextran polymers were assembled in alternating way on gold nanoparticles. Next, the gold nanoparticles were removed by core dissolution and rhodamine B, as model guest was encapsulated inside the hollow carriers by diffusion.

BCD, RAMEB and DIMEB, respectively, were grafted to polysaccharides, such as hyaluronic acid and hydroxyethyl starch to get drug delivery systems of reduced cytotoxicity [8]. The toxicity of BCD was diminished also by conjugating alkyl (C10) chains via biotransesterification and interacting with PEGylated amphiphiles to result in nanoprecipitate useful for drug delivery [9]. Self-assembled amphiphilic CDs (modified with lauryl groups) were used as nanovesicles for delivery of etoposide anticancer drug [10].

Antibacterial hydroxyapatite/chitosan/CD polymer spongy hybrid was prepared for bone regeneration [11]. The hydrogel was obtained by self-association of chitosan and CD polymer crosslinked by citric acid in the presence of hydroxyapatite and impregnated with ciprofloxacin, as model antibiotic. Enhancing the CD polymer content in the hydrogel resulted in decreased swelling and faster rate of drug release. The antibacterial activity was confirmed on *E. coli* and *S. aureus*.

Core-shell poly(*N*-isopropylacrylamide) (pNIPAm) – polyacrylic acid (negatively charged) microgels were modified by electrostatic adsorption of preformed host-guest complexes between quaternary amino CD polymer (pBCD-N<sup>+</sup>) and (PEG, adamantane)-grafted dextrans to obtain nanoparticles as drug carriers with improved release kinetics and thermo-responsive properties [12]. Another thermoresponsive self-assembled cyclodextrin-end-decorated pNIPAM was prepared as “smart catalyst” for aqueous hydroformulation [13].

Fixed dose combination bioadhesive films were obtained by printing on film. The inks contained the anticancer and antiviral drugs solubilized via complex formation with CDs [14]. Nanoparticulate cidofovir and paclitaxel-cyclodextrin complex were combined to obtain adhesive films against Human Papilloma Virus (HPV) infection.

Drug (dexamethasone and amphotericin B)/GCD/HPGCD mixed complex was stabilized by poloxamer resulting in aggregates as self-assembly nanoparticles [15]. A mixture of BCD and GCD was crosslinked with epichlorohydrin to get hydrogel carriers for a combination of two drugs (flurbiprofen and omeprazole) to apply an antiinflammatory agent together with a gastrointestinal protector [16].

CD was modified with 1,4,7,10-tetraazacyclododecane-1,4,7,10-tetraacetic acid (DOTA) an octacoordinating chelator of gadolinium to obtain a contrasting agent which preserved the inclusion complex forming ability [17]. It can be useful for studying the therapeutic effect of the drug delivered by this system by MRI.

Nanofibers were produced by electrospinning ACD- and BCD-epichlorohydrin polymers using poly( $\epsilon$ -caprolactone) or poly(*N*-vinylpyrrolidone) matrices and fluconazole as antifungal drug [18]. Good thermal stability and sustained drug release characterized the nanofiber formulation.

The mixture of antibacterial agent triclosan with chitosan itself and blended with HPBCD or CD polymer crosslinked with citric acid were also transferred to nanofibers by electrospinning to obtain drug delivery systems with high surface area and porosity [19].

Monosubstituted cationic cyclodextrins were prepared and labeled with rhodamine B or fluorescein [20]. Their complex forming ability was studied using acridine orange, a fluorescent dye using capillary electrophoresis. The skin penetration was proved by two photon confocal microscopy.

Monosubstituted 2<sup>I</sup>-O-, 3<sup>I</sup>-O- and 6<sup>I</sup>-O-(3-(naphthalen-2-yl)prop-2-en-1-yl) derivatives of GCD were prepared to be used as building blocks for supramolecular polymers [21].

The increasing number of nanoparticles developed for drug delivery also challenge the authorities. Changes in the regulatory approach toward nanomedicines were interpreted based on the new guidelines of FDA and EMA [22].

Folate-adamantanyl was complexed with non-ionic amphiphilic alkylthio derivatives of CDs and loaded with pheophorbide, a photosensitizer [23]. The nanoassemblies were found effective in photodynamic therapy of different breast cancer cell lines.

Nanoassemblies based on BCD polymer (HPBCD crosslinked with citric acid) were used as shell entrapping photosensitiser (porphyrin) to cover gold and silver nanoparticles for photothermal and photodynamic combined therapy (PTT-PDT) [24].

The synthesis of a bichromophoric BCD derivative bearing a nitroaniline moiety as a nitric oxide (NO) donor and an anthracene moiety as a fluorescence label for application in PDT was reported [25].

Injectable hydrogels, syringable implants were obtained by complexing polyethylene oxide-polypropylene oxide (Pluronic and Tetronic) polymers with ACD [26]. Vancomycin and simvastatin were used as model drugs in cell culture assays.

Surface modification using layer-by-layer technique based on the host-guest self-assembly or on the electrostatic interactions was applied by several teams.

A new generation of Drug Eluting Stents (DES) based on the strong anchorage of a biocompatible and bioresorbable cyclodextrin based polymer onto metallic devices has been elaborated [27]. Polydopamine (PDA), a strong adhesive polymer was applied as a first coated layer. CD was fixed by *in situ* polycondensation with citric acid. As a third layer an amine-rich polymer, polyethyleneimine was used to stabilize the anionic CD layer. As an alternative polyCD and chitosan layers were applied using layer-by-layer deposition technique.

A monolayer of a polyanionic BCD hyaluronamide was deposited on the surface of polydimethylsiloxane elastomers coated with amphiphilic protein hydrophobin [28].

Textiles were modified with multilayer CD polyelectrolites (citric acid-CD polymer and quaternary amino CD polymer) using layer-by-layer technique to obtain textiles with antibacterial properties to be applied as wound coatings, prostheses etc. [29]. Sustained release of three model compounds such as tert-butyl benzoic acid, methylene blue and triclosan was presented.

Fluorescent CD was grafted on silica to enhance the sensitivity and selectivity of sensing the volatile organic compounds (VOCs) [30]. BCD grafted to silica nanoparticles by environmentally benign microwave irradiation in water as solvent and by a solventless technology in planetary ball mill was loaded with palladium to obtain an efficient catalyst of coupling reactions and reductions [31].

Rod-like  $\text{Al}_2\text{O}_3$ , spherical  $\text{TiO}_2$  and fibrous  $\text{SiO}_2$  nanocatalysts were prepared combining supramolecular host-guest complexes with CDs and organometallic compounds [32].

In addition to the above examples several interesting works have been presented. The bibliographic data and the keywords based on the Abstract Book of the conference have been published in this issue of Cyclodextrin News.

The venue of the next EuroCD has been decided: it will be organized by Helene M. Cabral in Lisbon in October 2017.

## References

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5. Vivek D. Badwaik, Emilio Aicart, Yawo A. Mondjinou, Merrell A. Johnson, Valorie D. Bowman, David H. Thompson: Structure and Enhanced Performance of Cationic Hydroxypropyl- $\beta$ -cyclodextrin:Poly(ethylene glycol) Polyrotaxane Vectors for siRNA Delivery. Abstract Book O30
6. Jun Li: Supramolecular Functional Polymers Based on Cyclodextrins for Biomedical Applications. Abstract Book I1
7. Ewelina Wajs, Thorbjørn T. Nielsen, Kim L. Larsen, Alex Fragoso: Cyclodextrin-based stimuli-responsive nanocapsules with smart redox/light switching properties. Abstract Book P64
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11. Claudia Flores, Jean Christophe Hornez, Feng Chai, Gwenael Raoul, Nicolas Tabary, Frédéric Cazaux, Joel Ferri, Hartmut F. Hildebrand, Bernard Martel, Nicolas Blanchemain: Cross linking reaction between chitosan and poly-CTR cyclodextrin for the formation of a hybrid material for bone regeneration. Abstract Book Abstract Book O4
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14. Cem Varan, Niklas Sandler, Yeşim Aktaş, Erem Bilensoy : Nanoparticulate Cidofovir and Paclitaxel-Cyclodextrin Complex Combination in Ink Jet Printed Adhesive Film for HPV Infection. Abstract Book O16
15. Phennapha Saokham, Alexey Ryzhakov, Thorsteinn Loftsson: Aggregation behavior of self-assembled  $\gamma$ -cyclodextrin and its inclusion complexes in aqueous solution. P2
16. Paola Mendiburu, Arantza Zornoza, José Ramón Isasi, Itziar Vélaz:  $\beta/\gamma$ -cyclodextrin hydrogels containing complementary drugs. Abstract Book P21

17. Anaïs Biscotti, François Estour, Samuel Petit, Célia Bonnet, Eva Toth, Géraldine Gouhier: New Cyclodextrin-DOTA Conjugates as MRI Contrast Agent. Abstract Book O7
18. Alejandro Costoya, Florencia Montini Ballarin, Gustavo Abraham, Carmen Alvarez-Lorenzo, Angel Concheiro: Polycyclodextrin electrospun fibers for antifungal treatment. Abstract Book P36
19. Safa Ouerghemmi, Stéphanie Degoutin, Nicolas Tabary, Frédéric Cazaux, Ludovic Janus, F. Chai, Nicolas Blanchemain, Bernard Martel: Electrospun cyclodextrin functionalised chitosan nanofibres for triclosan release. Abstract Book O31
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22. Erem Bilensoy: Cyclodextrin Nanomedicines: Potential and Challenges in the Pharma Industry. Abstract Book I5
23. Giuseppe Sortino, Anna Piperno, Angela Scala, Valentina Rapozzi, Antonino Mazzaglia: Nanophototherapeutics based on folate- tailored amphiphilic cyclodextrins/ photosensitisers assemblies with potential in targeted PDT. Abstract Book O9
24. Antonino Mazzaglia, Mariachiara Trapani, Maria Angela Castriciano, Bernard Martel, Andrea Romeo, Luigi Monsù Scolaro: Nanoparticles based on metal noble core and a porphyrin entrapping cyclodextrin polymer shell for dual therapeutic action. Abstract Book P45
25. Gábor Benkovics, Milo Malanga, Éva Fenyvesi, Salvatore Sortino: Fluorescent cyclodextrins as photoactivable nanoplatfoms. Abstract Book FP5
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*Switchable and non-switchable, Coupling agent 4-(4,6-dimethoxy-1,3,5-triazin-2-yl)-4-methylmorpholinium (DMTMM), 6-Monoamino- $\beta$ -cyclodextrin, 6-Monopiperazinyl- $\beta$ -cyclodextrin, Two corresponding methylated- $\beta$ -CD analogues (NH<sub>2</sub>-TRIMEB and PIP-TRIMEB), Rhodamine-, fluorescein- and eosine-appended derivatives*

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Benkovics, G.; Malanga, M.; Fenyvesi, É.; Sortino, S.

**FP5 : Fluorescent cyclodextrins as photoactivable nanoplatforms**

*6-Monodeoxy-6-monoazido-6'-monotosyl- $\beta$ -cyclodextrin, Release of NO under visible light irradiation, Fluorescent tagging, NO stimulated therapy*

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Bláhová, M.; Jindřich, J.

**P17 : Preparation of  $\gamma$ -cyclodextrin derivatives usable for construction of self-assembled structures**

*2<sup>I</sup>-O-, 3<sup>I</sup>-O- and 6<sup>I</sup>-O-(3-(Naphthalen-2-yl)prop-2-en-1-yl) derivatives of  $\gamma$ -CD*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 95

Brunke, J.; Albrecht, M.; Przybylski, C.; Wenz, G.

**P8 : Synthesis of shape-persistent conjugates of  $\beta$ -cyclodextrin and poly(p-phenylenebutadienylene)s**

*Amide coupling, Amino-functional  $\beta$ -CD derivatives, Glaser-Eglinton coupling, Precursors for sensors*

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Celebioglu, A.; Uyar, T.

**FP8 : Electrospinning of insoluble poly-cyclodextrin nanofibers**

*Crosslinked CD polymer, Epichlorohydrin, Citric acid, 1,2,3,4-Butaneteracarboxylic acid, Hexamethylene diisocyanate*

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Faye, I.; Huin, C.; Bennevault-Celton, V.; Illy, N.; Guégan, P.

**P27 : Using phosphazene bases to design star polymers with a  $\beta$ -cyclodextrin core**

*Artificial nanopores, Per(3,6-di-O-(3-hydroxypropyl)-2-O-methyl)- $\beta$ -CD, Macroinitiator for butylene oxide anionic polymerization, 14-Arm star polymer*

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**P46 : Polymerization reaction between CD oxoanions and pyromellitic anhydride**

*Highly alkaline media, Polymer network*

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Kasal, P.; Jindřich, J.

**P30 : Synthesis of 6<sup>I</sup>-O-alkyl cyclodextrin derivatives using methoxymethyl protecting groups**

*6<sup>I</sup>-O-Monosubstituted cyclodextrin derivatives*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 108

Loubens, J.; Hoppenot, F.

**O35 : A review of dynamic vapor sorption applications in chemistry pharmaceutical and food industry**

*Water, acting as a plasticizer, Brunauer, Emmett, Teller, Guggenheim, Anderson, de Boer*

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Lumholdt, L.; Pipkin, J.; Antle, V.

**FP3 : The reaction between  $\alpha$ -amylase and Captisol® and other SBE-cyclodextrins**

*SBE- $\alpha$ -CD, SBE- $\beta$ -CD, SBE- $\gamma$ -CD, Porcine pancreatic  $\alpha$ -amylase, 3,5-Dinitrosalicylic acid, Orange-red colour*

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**O32 : Synthesis of cyclodextrin nanotubes based on a polyrotaxane**

*MALDI-TOF, transmission electron microscopy, Nanoparticles in lipid bilayer*

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Manta, C.; Peralta-Altier, G.; Seoane, G.; Ovsejevi, K.

**P26 : A novel eco-friendly synthesis of a thiolated cyclodextrin**

*Protein immobilization, Epoxy activation, Alkylthiosulfate preparation, Reductive treatment, Thiopropyl agarose, Size exclusion chromatography*

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**I6 : New challenges and opportunities in the synthesis of CD derivatives and CD-grafted materials**

*Key enabling technologies, Microwaves, Ultrasound, Ball milling, Hydrodynamic and cavitation systems, High-shear mixers, Atmospheric plasma, Micro- and meso-channels reactors, Series of hybrid reactors, permodified CDs, Hybrid CD platforms*

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**I2 : Inside new materials: Structure and dynamics of cyclodextrin-based polymers in solution and in the gel state**



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Menuel, S.; Doumert, B.; Saitzek, S.; Ponchel, A.; Delevoye, L.; Monflier, E.; Hapiot, F.

**O23 : Easy access to modified cyclodextrins by mechanosynthesis with supramolecular approach**

*Mono-2-tosyl-cyclodextrin, Friction, Regioselective mono-modification of cyclodextrin, Mono-(2,3-manno-epoxide)-cyclodextrin, Tosyl imidazole complex with  $\beta$ -CD*

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Moretti, F.; Dumarçay-Charbonnier, F.; Marsura, A.

**P28 : Towards synthetic promising coiland**

*Permethylated tris-A,C,E-(6,6'-byridyl)- $\alpha$ -cyclodextrin*

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**FP17 : Novel  $\beta$ CD polymers showing UCST behavior**

*RAFT-co-polymerization,  $\beta$ CD-methacrylate, Methyl methacrylate, Fluorescence, Upper critical solution temperature (UCST)*

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**FP13 : ESI vs. MALDI for lipidyl cyclodextrins characterization**

*Esterification of fatty acid chlorides on cyclodextrins*

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**O34 : Atomistic simulation of the nucleation stage of aggregation in non-polar solvents of amphiphilic cyclodextrins**

*Molecular dynamics, Thioalkyl groups, Ethylene glycol groups*

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**O14 : Toxicological study of  $\alpha$ -cyclodextrins, and synthesis of new derivatives**

*Caco-2 cell line, Human red blood cells, Cytotoxicity*

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**P42 : Self-assembly of  $\alpha$ -cyclodextrin in aqueous medium: Identification, characterization, method challenges**

*Dynamic light scattering experiments, Semi-permeable cellulose ester membrane*

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**P56 : Synthesis and surface grafting of a  $\beta$ -cyclodextrin dimer**

*6-Monodeoxy-6-monoazido- $\beta$ CD, Copper(I)-catalyzed azide-alkyne cycloaddition, 2-Anilino-naphthalene-6-sulfonic acid, Surface grafted onto silicon oxide surfaces*

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**P14 :  $\beta$ -cyclodextrin monoderivatives as complexing agents**

*Amino acid derivatives*

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Tichá, I.; Jindřich, J.

**P29 : Synthesis of new cyclodextrin derivatives for organocatalysis**

*6<sup>A,D</sup>-Dihydroxy-perbenzyl- $\alpha$ -CD, 6<sup>A</sup>-Azido-6<sup>A</sup>-deoxy-6<sup>C</sup>-O-mesitylenesulfonyl-  $\alpha$ -CD*

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Watson, C. A.; Wolzen, J. M.; Pipkin, J.; Antle, V. D.

**P25 : Captisol (SBECD) solution stability extreme formulation challenges**

*Fingerprint, Impurity profile, pH and color, Autoclave sterilization cycle*

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## 2. CD complexes: Preparation, Properties in solution and in solid phase, Specific guests

Alvira, E.

**P7 : Molecular dynamics simulation of the separation of valine enantiomers by  $\beta$ -cyclodextrin with different solvents**

*Electrospray mass spectrometry, Capillary electrophoresis, Gas chromatography, Molecular dynamics simulation, Binding free energy*

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Bertaut, E.; Landy, D.

**O8 : Towards an hybrid thermo-kinetic characterization of cyclodextrin complexes**

*Fast exchanges, Reduced experimental time, Ibuprofen*

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Caira, M. R.

**O3 : Physicochemical studies of the inclusion of antioxidants in cyclodextrins**

*Resveratrol, Lipoic acid, Substituted hydroxycinnamic acids, 2-Methoxyestradiol, Crucial role of water molecules, Mutual induced fit*

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Danel, C.; Melnyk, P.; Larchanché, P.-E.; Goossens, J.-F.; Vaccher, C.

**P48 : Evaluation of three neutral static coatings for the study of drug-cyclodextrin complexes by affinity capillary electrophoresis**

*Interactions between a polycationic N,N'- disubstituted piperazine derivated compound and four CDs of pharmaceutical interest:  $\beta$ -CD, HP- $\beta$ -CD, Me- $\beta$ -CD and SBE- $\beta$ -CD, Adsorption of CD in the capillary wall*

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Donato, C. D.; Caso, J.; Russo, L.; Palmieri, M.; Malgieri, G.; Isernia, C.; Iacovino, R.

**P5 : Investigating the inclusion properties of tyrosine complexing beta-cyclodextrins in model peptides**

*Aromatic aminoacids, N-terminus, C-terminus, Middle position, Engineer cyclodextrin-binding sites*

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Evdokimova, M. A.; Onuchak, L. A.; Blatov, V. A.; Golov, A. A.; Kuraeva, J. G.

**P10 : Application of IGC, mathematical modelling and methods of crystal chemistry for the binary systems – based on PEG-400 and  $\beta$ -CD**

*Inverse gas chromatography, Permethylated- $\beta$ -CD, Enantiomers of camphene and limonene*

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Farcas, A.; Resmerita, A.-M.; Aubert, P.-H.

**O2 : Effect of permodified cyclodextrin encapsulations on the photophysical properties of conjugated polyrotaxanes**

*Electronic devices, Poly(9,9-dioctylfluorene-alt-bithiophene)/randomly or permodified  $\beta$ CD derivatives)*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 14

García-Fandiño, R.; Mixcoha, E.; Rosende, R.; Piñeiro, Á.

**FP14 : Freshly baked computational tools for flexible cyclodextrins**

*Molecular dynamics simulations*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 48

González-Gaitano, G.; Radulescu, A.; da Silva, M. A.; Dreiss, C. A.

**O22 : Tuning viscoelasticity in Tetronic gels using cyclodextrins**

*Tetronics, four-arm block copolymers of poly(ethylene oxide)-poly(propylene oxide), Dimethylated CD, Self-aggregation*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 53

Hilschmann, J.; Wenz, G.; Leisen, J.

**P11 : Template controlled synthesis of nanotubes from  $\alpha$ -cyclodextrin**

*3,5-Dimethylphenyl groups, Crosslinkers as allyl bromide, Toluene-2,4-diisocyanate*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 89

Larsen, K. L.

**I8 : Channel type cyclodextrin crystals**

*Absorbent for guest molecules from gas phase, Solventless formulations*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 65

Lin, J.; Kong, T.; Ye, L.; Zhang, A.-Y.; Feng, Z.-G.

**O5 : Preparation of single polymer chain stranded  $\gamma$ -CD-based polyrotaxanes using twice ATRP**

*PHEMAs, PPO- PEG-PPO, Atom transfer radical polymerization (ATRP), Pentablock copolymer, Transformation from the double-chain stranded to the single-chain stranded, Hydrogels*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 22

Mathiron, D.; Oliva, E.; Bonnet, V.; Pilard, S.; Cailleu, D.; Djedaini-Pilard, F.

**P60 : Contribution of DOSY NMR to inclusion complexes study**

*$\gamma$ -CD/midazolam,  $\beta$ -CD with trans-resveratrol and methyl jasmonate*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 139

Przybylski, C.; Cézard, C.; Ponchel, A.; Monflier, E.; Bonnet, V.

**O28 : Electrospray-mass spectrometry (ESI-MS): A window of opportunity to study  $\beta$ -cyclodextrin-metal complexes**

*Li, Na, K*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 61

Raffaini, G.; Ganazzoli, F.

**P61 : Dimeric inclusion complexes of cyclodextrins with fullerenes**

*$\gamma$ - and  $\delta$ -Cyclodextrins and C70*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 140

Rossignol, J.; Rudiuk, D. S.; Ménand, D. M.; Bouteiller, P. L.; Baigl, P. D.; Sollogoub, P. M.

**O10 : Cyclodextrin-based supramolecular structures: An original way to compact DNA**

*Bridged CD to hinder self-inclusion, Adamantyl, phenyl moieties*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 28

Tuza, K.; Jicsinszky, L.; Sohajda, T.; Csabai, K.; Fenyvesi, É.

**P62 : Modified cyclic and acyclic dextrins: Synthesis and complexation ability**

*Maltooligomers – functionalized with neutral (methyl), negatively and positively charged (sulfobutyl, carboxymethyl and quaternary ammonium) moieties, Complex association constants*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 141

### 3. CDs in Drug Formulation

Adeoye, O.; Gouveia, L. F.; Salústio, P. J.; Cabral-Marques, H.

**P24 : Validation of a kneading process for drug-cyclodextrin complex formation**

*Ibuprofen,  $\beta$ -Cyclodextrin, Automatic mixing equipment*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 102

Agnes, M.; Thanassoulas, A.; Stavropoulos, P.; Nounesis, G.; Miliotis, G.; Miriagou, V.; Yannakopoulou, K.

**FP10 : Enhancement of cyclodextrin-penicillin complexation through designed host-guest interactions**

*Ampicillin, Amoxicillin, Oxacillin, Meticillin, Natural  $\beta$ CD and  $\gamma$ CD, Positively charged CD hosts*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 35

Alvarez-Lorenzo, C.

**I4 : Self-assembled poly(pseudo)rotaxane gels for drug delivery**

*PEO-PPO based copolymers (Pluronic and Tetronic),  $\alpha$ -CD, Animal models, Bone reparation, Injectable hydrogels, Syringable implants, Vancomycin, Simvastatin*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 40

Argenziano, M.; Artuso, E.; Caldera, F.; Prandi, C.; Trotta, F.; Cavalli, R.

**P23 : Strigolactone analogues loaded in  $\beta$ -cyclodextrin nanospheres as innovative anticancer formulations**

*Carbo-nanosponges, Pyro-nanosponges, Slow release kinetics*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 101

Belica-Pacha, S.; Buczkowski, A.; Pałecz, B.

**FP4 : Dendrimers and cyclodextrins as drug carriers – Physicochemical examinations**

*Fludarabine phosphate, Gemcytabine*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 19

Belica-Pacha, S.; Buczkowski, A.; Waliszewski, D.; Pietrzak, A.; Piekarski, H.; Girek, T.; Trotta, F.; Caldera, F.; Pałecz, B.

**P59 : Comparison of interactions between fludarabine phosphate and dendrimers or cyclodextrins as nanocontainers**

*Calorimetric method*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 138

Bilensoy, E.

**I5 : Cyclodextrin nanomedicines: Potential and challenges in the pharma industry**

*Regulation of generic products of nanomedicines, Nanosimilars, Cyclodextrin-based nanoparticles inkjet printed, Camptothecin, Folic acid modified CD for tumor targeting, Personalized medicine, 6-O-Capro- $\beta$ -CD (polyanionic derivative), Polycationic CD, Selective apoptotic effect*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 49

Biscotti, A.; Estour, F.; Petit, S.; Bonnet, C.; Toth, E.; Gouhier, G.

**O7 : New cyclodextrin-DOTA conjugates as MRI contrast agent**

*Chelate Gd, 6-Amino CD derivatives, DOTA for chelating gadolinium*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 24

Bochot, A.; Hamoudi, M.; Trichard, L.; Fattal, E.

**I9 : Oil-cyclodextrin based beads for skin and oral delivery of poorly-soluble drugs**

*Soybean oil, Wheat germ and sweet almond oils, Mineral oils, Silicone oils,  $\alpha$ CD,  $\gamma$ CD, Isotretinoin, Adapalene, Progesterone, Diazepam, Indomethacin*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 74

Brégier, F.; Letort, S.; Mathiron, D.; Grel, T.; Albaret, C.; Daulon, S.; Djedaïni-Pilard, F.; Gouhier, G.; Estour, F.

**O17 : Functionalized cyclodextrins, as biomimetic materials to degrade nerve agents**

*Soman, Sarin, VX, Chemical weapon agent, Cyclodextrin derivatives bearing two different groups, Permethylated- $\beta$ -cyclodextrin scaffold, Cyclodextrin dimer linked by a chain bridge containing ethylenic unsaturation*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 43

Carvalho, L. B.; Adneia; Venceslau, F. A.; Rocha, D. A.; Carlos; Cardiel, J.; Venâncio, T.; Pinto, L. M. A.

**P43 : Theoretical and experimental characterization of inclusion complexes containing the hormone methyltestosterone**

*Liophilization, NMR, 2D ROESY, Vacuum and solvent simulations*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 122

Castiglione, F.; Ferro, M.; Punta, C.; Melone, L.; Pastori, N.; Panzeri, W.; Trotta, F.; Rossi, B.; Mele, A.

**P15 : Relaxation properties of a drug model in cyclodextrin-based cross-linked polymers by solid-state NMR spectroscopy**

*Cross-relaxation time, Spin lattice relaxation of the protons, Cross-polarization, Ibuprofen, Guest-polymer interactions, Branching*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 93

Cavalli, R.; Argenziano, M.; Caldera, F.; Brunella, V.; Trotta, F.

**P22 :  $\beta$ -Cyclodextrin nanosponge technology for the oral delivery of insulin**

*Pyromellitic nanospheres, Oral administration to rats, Diabetic mice, Lower glucose blood concentration*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 100

Celen, N.; Ozturk, N.; Bilensoy, E.; Calis, S.

**P63 : Cefixime oral bioavailability improved by cyclodextrin inclusion complex: *In vitro* - *in vivo* evaluation**

*HP- $\beta$ -CD, Me- $\beta$ -CD, Kneaded complex, Caco-2 cell culture model, *In vitro* permeation*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 142

Costoya, A.; Ballarin, F. M.; Abraham, G.; Alvarez-Lorenzo, C.; Concheiro, A.

**P36 : Polycyclodextrin electrospun fibers for antifungal treatment**

*Cross-linking with epichlorohydrin, Fluconazole, Poly( $\epsilon$ -caprolactone), Poly(*N*-vinylpyrrolidone)*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 115

Cutrín-Gómez, E.; Anguiano-Igea, S.; Sheng, H. C.; Gómez-Amoza, J. L.; Otero-Espinar, F. J.

**P49 : Study of the effect of partially methylated  $\beta$ -cyclodextrin and 2-hydroxypropyl- $\beta$ -cyclodextrin in the structure and permeability of the nail**

*Increased porosity, Higher water permeability, Ciclopirox*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 128

Erdoğar, N.; Nielsen, T. T.; Öner, L.; Esendağlı, G.; Bilensoy, E.

**O6 : *In vitro* and *in vivo* evaluation of tumor-targeted nanoparticles for paclitaxel delivery with folate-conjugated amphiphilic cyclodextrin derivatives**

*Nanoprecipitation, Fluorescent loaded nanoparticles, Toxicity*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 23

Ferreiro, A. F.; Tomé, V. D.; Barcia, M. G.; Méndez, J. B.; Espinar, F. J. O.

**P50 : Comparative ocular toxicity study of some cyclodextrins**

*$\alpha$ -CD,  $\beta$ -CD, HP- $\beta$ -CD, Me- $\beta$ -CD, Human Corneal Keratocytes, Cell index, Acute irritancy*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 129

Flores, C.; Hornez, J. C.; Chai, F.; Raoul, G.; Tabary, N.; Cazaux, F.; Ferri, J.; Hildebrand, H. F.; Martel, B.; Blanchemain, N.

**O4 : Cross linking reaction between chitosan and poly-CTR cyclodextrin for the formation of a hybrid material for bone regeneration**

*Bone repair defects, Hydroxyapatite, Antibacterial spongy hybrid, Ciprofloxacin*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 21

Garcia-Fernandez, M. J.; Tabary, N.; Willart, J. F.; Blanchemain, N.; Flamant, M.-P.; Martel, B.

**P57 : New pharmaceutical excipient based on polymers of cyclodextrins**

*PolyCTR-CDs, Ibuprofen, Citric acid, CTR, Kneading*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 136

González-Gaitano, G.; Puig, J.; Mazzaglia, A.; Dreiss, C. A.

**P16 : Effects of modified cyclodextrins on the aggregation behaviour of the D- $\alpha$ -tocopheryl polyethylene glycol succinate (TPGS)**

*Micellisation properties, precipitation of the insoluble pseudorotaxane, DIMEB, Chaotropic effect*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 94

Hădărugă, D. I.

**O12 : Bioconjugate-cyclodextrin interactions. Enzymatic synthesis and cyclodextrin inclusion studies of natural antioxidant-essential fatty acid bioconjugates**

*Taxifolin, Silibinin, Naringin, Hesperidin, Rutin, Palmitic acid, Stearic acid, Arachidic acid, Behenic acid, Oleic acid, Linoleic acid, Eicosapentaenoic acid, Docosahexaenoic acid, Enhanced bioavailability*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 36

Hallouard, F.; Bounoure, F.; Milon, N.; Skiba, M.; Skiba, M.

**P55 : Evaluation of new cyclodextrin polymers for solubilization, complexation and spray dried amorphous solid dispersions of poorly soluble compounds**

*Direct hot-melt polycondensation with a linker, Nimesulide, Fenofibrate, Progesterone, Albendazole, Cyclosporine, Poly  $\alpha$ -CD, Poly  $\beta$ -CD*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 134

Heel, A.; Steckel, H.

**FP2 : Development of hot-melt extrusion process with  $\beta$ -cyclodextrin and itraconazole for inclusion complex formation – A first approach**

*Kneading zones, Extrudates,  $\beta$ -CD degradation*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 17

Işık, G.; Ercan, A.; Öncül, S.; Benito, J. M.; Mellet, C. O.; Bilensoy, E.

**FP18 : Apoptotic and anticancer effects of anionic and polycationic amphiphilic cyclodextrin nanoparticles**

*Anionic (6OCapro  $\beta$ CD), Polycationic ( $\beta$ CDC6) amphiphilic CD, Paclitaxel, L929 cell line, MCF-7 human breast cancer cell line*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 73

Iurii, A.; Daria, K.; Veronique, W.; Volet, G.; Nielsen, T. T.; Varga, I.; Amiel, C.

**O1 : Thermo-responsible pNIPAm microgels with external p $\beta$ CD-N+ shell sterically stabilized via host-guest interactions**

*Poly(N-isopropylacrylamide), (PEG, adamantane)-grafted dextrans,  $\beta$ -cyclodextrin polymers, Core-shell microgels, Thermo-responsibility*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 13

Jansook, P.; Pichayakorn, W.; Muankaew, C.; Loftsson, T.

**P1 : Cyclodextrin-poloxamer aggregates as nanocarriers for eye drop formulation: Dexamethasone and amphotericin B as model drugs**

*$\gamma$ CD/HP $\gamma$ CD mixtures, Surface tension, Multi-component aggregates*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 79

Junthip, J.; Tabary, N.; Martel, B.; Blanchemain, N.; Chai, F.; Hedoux, A.; Landy, D.; Leclercq, L.

**O15 : Dual cyclodextrin polyelectrolyte multilayer coatings on textile for controlled drug delivery**

*Layer-by-layer technique, tert-Butyl benzoic acid, Methylene blue, Triclosan, Reducing bacterial colonization, Cationic CD polymer (GTMAC), Neutral poly(EP-CD), Anionic poly(CTR-CD), Antibacterial activity*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 41

Kfoury, M.; Borgie, M.; Verdin, A.; Ledoux, F.; Courcot, D.; Auezovaa, L.; Greige-Gergesa, H.; Fourmentin, S.

**P51 : Improvement of phenylpropenes anti-inflammatory effects by encapsulation in hydroxypropyl- $\beta$ -cyclodextrin**

*trans-Anethole, Estragole, Eugenol, Isoeugenol, Human bronchial epithelial cell line*



(BEAS-2B), Human liver carcinoma cell line (HepG2), Cytokines, Photostability

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 130

Laure, W.; Anes, A. P.; Gargouri, M.; Sobocinski, J.; Berghe, H. V. D.; Courcot, E.; Tabary, N.; Chai, F.; Blanchemain, N.; Martel, B.; Lyskawa, J.

**P54 : Cyclodextrin based polymers for the elaboration of multifunctional drug eluting stents**

*Reduce the risks of both restenosis and thrombosis, Polycondensation of the cyclodextrin unit and citric acid, Polyethyleneimine, Polyelectrolyte multilayer assemblies, Chitosan*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 133

Leclercq, L.; Nardello-Rataj, V.

**O20 : Pickering emulsions based on cyclodextrins for antifungal econazole nitrate topical delivery**

*Biocompatible emulsifiers such as native cyclodextrins, Oil/CD complexes*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 51

Li, J.

**I1 : Supramolecular functional polymers based on cyclodextrins for biomedical applications**

*Self-assembled macromolecular systems, Triblock copolymers,  $\alpha$ -CD,  $\beta$ -CD,  $\gamma$ -CD, Dimethyl- $\beta$ -CD, Redox-sensitive and targeted gene delivery systems, Pyrene-terminated PEG star polymers*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 12

Mafilaza, Y. A.; Dogbe, M. G.; Eleutério, C. V.; Simões, S. I.; Gaspar, M. M.; Cabral-Marques, H.

**O37 : Pulmonary administration of fluticasone propionate cyclodextrin complexes using a new inhalation chamber**

*Aerodynamic characteristics, Respiratory epithelial cell line, Animal model of asthma*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 77

Malanga, M.; Benkovics, G.; Sohajda, T.; Thomsen, H.; Ericson, M. B.; Fenyvesi, É.

**O26 : Synthesis and characterization of cationic cyclodextrins and their use as skin penetration enhancer**

*6-Monosubstituted and per-6-substituted cationic cyclodextrins bearing N-heterocycles such as piperazine, piperidine, pyrrolidine or morpholine, Rhodamine B, Fluorescein, Acridine orange, Movements of the model compound through skin*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 58

Markenstein, L.; Appelt-Menzel, A.; Metzger, M.; Wenz, G.

**O27 : Conjugates of  $\beta$ -cyclodextrin and polysaccharides: Synthesis, cytotoxicity and inclusion of anaesthetic actives**

*Mono 6-deoxy-6-azides of  $\beta$ -CD, DIMEB, RAMEB, Propargylated hydroxyethyl starch, Hyaluronic acid, Sevoflurane, Midazolam, Propofol, Cytotoxicities, Decreasing toxicity by binding to carbohydrates, Soluble complexes*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 60

Maurin, A. G. D.; Gèze, A.; Blanc-Marquis, V.; Putaux, J.-L.; Lancelon-Pin, C.; Choisnard, L.; Levilly, D.; Perret, P.; Bacot, S.; Soubies, A.; Debiossat, M.; Ghezzi, C.; Riou, L.; Wouessidjewe, D.

**P12 : Toxicity studies of nanoparticles made of PEGylated phospholipids/biotransesterified  $\beta$ CD**

*Repeated intraperitoneal injections in mice, HeLa cells*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 90

Mazet, R.; Gèze, A.; Choisnard, L.; Putaux, J.-L.; Blanc-Marquis, V.; Levilly, D.; Wouessidjewe, D.

**P13 : Design of new cyclodextrin formulations for dexamethasone ocular delivery**

*HP- $\beta$ -CD, Ocular residence time, Biotransesterified  $\beta$ -CD or  $\beta$ -CD bearing decanoic chains, Nanoprecipitation, Colloidal stability*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 91

Mazzaglia, A.; Trapani, M.; Castriciano, M. A.; Martel, B.; Romeo, A.; Scolaro, L. M.

**P45 : Nanoparticles based on metal noble core and a porphyrin entrapping cyclodextrin polymer shell for dual therapeutic action**

*Photosensitiser, Photothermal and photodynamic combined therapy, Gold and silver NPs, HP- $\beta$ -CD, Citric acid*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 124

Mendes, C. G.; Howe, O.; McNamara, M.

**P19 : Evaluation of a drug delivery system based on cyclodextrins for cancer therapy**

*Methotrexate, Folic acid, Skov-3, HeLa and MCF-7 in vitro cell lines, Gene and protein expression levels*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 97

Mendiburu, P.; Zornoza, A.; Isasi, J. R.; Vélaz, I.

**P21 :  $\beta/\gamma$ -Cyclodextrin hydrogels containing complementary drugs**

*Flurbiprofen, Omeprazole, Polymer containing  $\beta$ - and  $\gamma$ -CDs crosslinked with epichlorohydrin, Sustained release of both drug*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 99

Miliotis, G.; Lampropoulou, M.; Agnes, M.; Kotsakis, S. D.; Tzouvelekis, L. S.; Yannakopoulou, K.; Miragou, V.

**P38: Polycarboxylated EDTA-type cyclodextrins as inhibitors for metallo-beta-lactamases produced by Gram-negative pathogens**

*Chelating properties with metal cations, Klebsiella pneumoniae clinical isolate, Imipenem, Enhanced antibacterial activity*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 117

Monteil, M.; Lecouvey, M.; Landy, D.; Ruellan, S.; Mallard, I.

**FP15 : Cyclodextrins: Future drug delivery vehicle for bisphosphonates**

*Osteoporosis,  $\beta$ -CD,  $\alpha$ -CD, HP $\beta$ CD, RAMEB*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 70

Muankaew, C.; Jansook, P.; Loftsson, T.

**P3 : Amorphous cyclodextrin complex of telmisartan for topical delivery to the eye**

*Alkalizing agent, Particle sizes, Poloxamer 407*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 81

Nolay, F.; Sevin, E.; Djedaïni-Pillard, F.; Kirat, K. E.; Gosselet, F.; Tilloy-Fénart, L.; Morandat, S.; Bonnet, V.

**O24 : New amphiphilic cyclodextrins able to form vesicles releasing slowly loaded atazanavir and cross the blood brain barrier**

*Diolelyphosphite, Permethyated 6-amino-6-deoxy- $\beta$ -CD, Vesicles with natural phospholipids, Critical aggregation concentration*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 56

Olteanu, A. A.; Aramă, C.-C.; Monciu, C. M.

**P35 : Studies of cyclodextrin based nanosponges complexes with angiotensin converting enzyme inhibitors (enalapril, captopril, cilazapril)**

*Organic carbonates, Membrane transfer*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 114

Omtvedt, L. A.; Dalheim, M. Ø.; Nielsen, T. T.; Larsen, K. L.; Strand, B. L.; Aachmann, F. L.

**FP6 : Partially oxidized alginate grafted with  $\beta$ -CyD: A potential release system for biomedical molecules**

*Partially oxidized alginate, Reductive amination, Click-chemistry, Methyl orange, Alginate beads*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 31

Ouerghemmi, S.; Degoutin, S.; Tabary, N.; Cazaux, F.; Janus, L.; Chai, F.; Blanchemain, N.; Martel, B.

**O31 : Electrospun cyclodextrin functionalised chitosan nanofibres for triclosan release**

*HP $\beta$ CD, Cyclodextrin polymer (polyCTR-HP $\beta$ CD)*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 66

Patel, M. R.; Vavia, P. R.

**P32 : Self-assembled nano-vesicles of modified  $\beta$ -cyclodextrin for delivery of Etoposide**

*Lauroyl chloride, Nanoformulation*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 110

Puskás, I.; Tuza, K.; Szemán, J.; Csabai, K.; Varga, E.; Sohajda, T.; Szente, L.

**I7 : Sulfobutylether-cyclodextrins: Structure, degree of substitution and functional performance**

*Sulfobutyl ether cyclodextrin library, Effect of cavity size and DS*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 59

Rossi, B.; Venuti, V.; D'Amico, F.; Gessini, A.; Mele, A.; Punta, C.; Melone, L.; Majolino, D.; Crupi, V.; Trotta, F.; Masciovecchio, C.

**O25 : Towards an understanding of the mechanism of thermo-activated release of active agents in cyclodextrin nanosponge hydrogels**

*Caffeine, Non-covalent interactions*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 57

Rudrangi, S. R. S.; Trivedi, V.; Alexander, B. D.; Wicks, S. R.

**O18 : Preparation of olanzapine and methyl- $\beta$ -cyclodextrin complexes using a single-step, organic solvent-free supercritical fluid process: An approach to enhance the solubility and dissolution properties**

*Co-evaporating, Freeze drying, Physical mixing, Organic solvent-free SC-CO<sub>2</sub> inclusion method*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 44

Saokham, P.; Ryzhakov, A.; Loftsson, T.

**P2 : Aggregation behavior of self-assembled  $\gamma$ -cyclodextrin and its inclusion complexes in aqueous solution**

*Semi-permeable cellulose membrane technique, Hydrocortisone/ $\gamma$ CD*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 80

Savic-Gajic, I. M.; Savic, I. M.; Nikolic, V. D.; Nikolic, L. B.; Kapor, A. J.; Popsavin, M. M.

**P47 : Enhancement of carvedilol water solubility and photostability using cyclodextrins inclusion complexes**

*Antihypertensive drug, HP- $\beta$ -CD, Bioavailability*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 126

Semeraro, P.; Fini, P.; Chimienti, G. A.; Gargano, M. F.; Altamura, E.; Rizzi, V.; Agostiano, A.; Cosma, P.

**P66 : Use of cyclodextrins as drug delivery systems for PDT *in vitro* applications**

*Localized tumours, Reactive oxygen species, Porphyrins and their analogous, Chlorophyll a/cyclodextrins complexes, HP- $\beta$ -CD, HP- $\gamma$ -CD, DIMEB, TRIMEB, Annexin V, Propidium iodide staining, Apoptosis, Necrosis*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 145

Sohajda, T.; Fenyvesi, É.; Szente, L.

**P58 : Cucurbiturils and cyclodextrins: Comparison of complexation behavior and analytical characterization**

*Interaction affinities between host and guest molecules, Neuromuscular blocking agents*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 137

Sortino, G.; Piperno, A.; Scala, A.; Rapozzi, V.; Mazzaglia, A.

**O9 : Nanophototherapeutics based on folate-tailored amphiphilic cyclodextrins/ photosensitisers assemblies with potential in targeted PDT**

*Pheophorbide, Photosensitiser, Cell growth on different breast cancer cell lines, Light irradiation, Singlet oxygen generation*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 27

Torres, L. H.; Venceslau, A. F. A.; Cardiel, C. J.; Pinto, L. M. A.

**P41 : Physicochemical characterization of the antimalarial Primaquine in cyclodextrin**

*Hydroxypropyl-beta-cyclodextrin, Non-inclusion complex*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 120

Varan, C.; Sandler, N.; Aktaş, Y.; Bilensoy, E.

**O16 : Nanoparticulate cidofovir and paclitaxel-cyclodextrin complex combination in ink jet printed adhesive film for HPV infection**

*Human Papilloma Virus, Combination product loaded with both anticancer and antiviral drugs, Paclitaxel:hydroxypropyl-β-cyclodextrin, Polyethylene glycol-polycaprolactone, Printing technology*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 42

Varga, E.; Szente, L.

**P18 : Drug-sulfobutylether cyclodextrin interactions. Effect of cavity size and degree of substitution**

*Ionic interactions, Hydrophobic interactions, Complex association constants*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 96

Venuti, V.; Rossi, B.; D'Amico, F.; Mele, A.; Punta, C.; Melone, L.; Crupi, V.; Majolino, D.; Trotta, F.; Gessini, A.; Masciovecchio, C.

**FP11 : Vibrational properties of a drug model in cyclodextrin-based cross-linked polymers: A combined FTIR-ATR and Raman spectroscopy investigation**

*Nanosponges, Hydrogen bond dynamics, Drug delivery*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 45

Vito, R.; Sergio, M.; Paola, F.; Andrea, V.; Poala, S.; Angela, A.; Francesco, L.; Pinalysa, C.

**P37 : Sulfur nucleoside/cyclodextrins inclusion complexes for potential application in PDT: An investigation by UV-Visible, <sup>1</sup>H-NMR, FTIR-ATR and cyclic voltammetry analysis**

*Psoriasis, Superficial tumors, Thiobases, used as a photosensitizer, Reactive oxygen species, 4-Thiothymidine*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 116

Zhang, P.; Wang, A.; Dune, L. E.; Klassen, J.; Ling, C.-C.

**O21 : The inclusion properties of polyionic cyclodextrins**

*Sugammadex analog, Sulfo-PEG thioether, Improved biocompatibility*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 52

## 4. CDs in Cell Biology

Badwaik, V. D.; Aicart, E.; Mondjinou, Y. A.; Johnson, M. A.; Bowman, V. D.; Thompson, D. H.

**O30 : Structure and enhanced performance of cationic hydroxypropyl-β-cyclodextrin: Poly(ethylene glycol) polyrotaxane vectors for siRNA delivery**

*Pluronic-based, cholesterol end-capped cationic polyrotaxanes, HP $\beta$ CD, Silencing efficiency*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 63

## 5. CDs in Food, Cosmetics and Agrochemicals

Azzi, J.; Auezova, L.; Danjou, P.-E.; Greige-Gergesa, H.; Fourmentin, S.

**P52 : Encapsulation of bioactive molecules in cyclodextrins to improve food organoleptic and nutritional properties**

*Phase solubility studies, Antioxidant activity*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 131

Fourtaka, K.; Christoforides, E.; Pappaioannou, A.; Bethanis, K.

**P31 : Crystal structure and molecular dynamics studies of inclusion compounds of agrochemicals and natural products in native and methylated  $\beta$ -cyclodextrins**

*Mepiquat chloride, Eucalyptol, Linalool*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 109

Kayaci, F.; Aytac, Z.; Uyar, T.

**O29 : Electrospun nanofibers from flavor/fragrance-cyclodextrin-inclusion complexes**

*Geraniol, Limonene, Linalool, HP $\beta$ CD, HP $\gamma$ CD, Me $\beta$ CD, Antibacterial activity*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 62

Kfoury, M.; Auezova, L.; Greige-Gerge, H.; Fourmentin, S.

**O19 : Improvement of essential oils properties by encapsulation in cyclodextrins: Solubility, stability, release and radical scavenging studies**

*Static headspace-gas chromatography, Total organic carbon measurements, Multiple headspace extraction, Solubilizing potential, Photodegradation*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 50

Oliva, E.; Mathiron, D.; Bonnet, V.; Courot, E.; Pilard, S.; Cailleu, D.; Clément, C.; Bertaut, E.; Landy, D.; Fourmentin, S.; Djedaini-Pilard, F.

**O36 : Physico-chemical studies to investigate the mechanism of action of cyclodextrins on trans-Resveratrol bio-production**

*Nutraceuticals, Cosmetics, Elicitor compound, Methyl jasmonate,  $\beta$ CD, DIMEB*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 76

Ovsejevi, K.; Peralta-Altier, G.; Manta, C.

**P33 : A sulphur containing  $\beta$ -cyclodextrin derivative as a potential tool for controlling the catalytic activity of polyphenol oxidases**

*Polyphenol oxidases, Thiol-CD, Browning index, Sliced apple*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 111

Ünlüsayın, M.; Hădărugă, N. G.; Gruia, A. T.; Birău (Mitroi), C.; Hădărugă, D. I.

**P39 : Nanoencapsulation competitiveness, thermal and oxidative stability of salmon oil –  $\beta$ -cyclodextrin complexes**

*Omega-3 fatty acid, fish oil, Crystallization from ethanol-water solvent mixture, Kneading, Eicosapentaenoic acid (EPA), Docosa-hexaenoic acid (DHA)*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 118

Venceslau, A. F. A.; Rocha, D. A.; Carvalho, L. B.; Ambrósio, D. L.; Pinto, L. M. A.; Cardiel, C. J.

**P40 : Evaluation of interaction between the atrazine herbicide and cyclodextrin hybrids**

*Hybrids with CD and silica, Phase solubility*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 119

## 6. CDs for other Industrial Applications

Armspach, D.

**I3 : Phosphorus and cyclodextrins: A winning combination for coordination chemistry and catalysis**

*Metalloccavitand, Permethyl CD, Ruthenium, Palladium, Chlorido ligands*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 25

Bleta, R.; Menuel, S.; Machut, C.; Ponchel, A.; Monflier, E.

**FP16 : Cyclodextrin based supramolecular assemblies with tailorable architectures for the synthesis of nanostructured inorganic materials**

*Colloidal self-assembly, Organometallic compounds, Metal-capped catalysts, Template*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 71

Bugnet, J.; Euvrard, É.; Druart, C.; Morin-Crini, N.; andd Cesare Cosentino, D. R.; Bacquet, M.; Martel, B.; Crini, G.

**O13 : Pollutant removal by nonwoven PET coated with cross-linked cyclodextrins**

*Activated carbons, Organic resins, Bag filters modified by cyclodextrins, Nonwoven poly(ethyleneterephtalate) coated with a cyclodextrin-1,2,3,4-butane tetracarboxylic polymer, Removal of minerals and organics present in real discharge waters, Comparison with a similarly prepared linear maltodextrin*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 37

Caporaso, M.; Baricco, F.; Martina, K.; Cravotto, G.

**FP7 : Preparation of highly functionalized  $\beta$ -cyclodextrin-grafted silica under non-conventional techniques**

*Microwaves, Ultrasound, Mechanochemistry, Planetary ball mill, Loaded with palladium nanoparticles, Catalytic activity*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 32

Euvrard, É.; Morin-Crini, N.; Ruffin, D.; Poupene, A.; Druart, C.; Bugnet, J.; Cosentino, C.; Bradu, C.; Lagarrigue, C.; Gavaille, S.; Bacquet, M.; Martel, B.; Crini, G.

**FP1 : Cross-linked cyclodextrin-based adsorbents vs conventional materials in the treatment of discharge waters from surface-treatment industries: What about priority pollutants removal?**

*Butanetetracarboxylic acid, Polycarboxylic acid as crosslinking agent, Synthetic solutions and real effluents from surface-finishing plants, Nickel, Nonylphenols, Octylphenols, Volatile organic compounds, Polycyclic aromatic compounds, Toxicity tests*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 16

Ferreira, M.; Jérôme, F.; Bricout, H.; Menuel, S.; Landy, D.; Fourmentin, S.; Tilloy, S.; Monflier, E.

**O11 : Low melting mixtures based on cyclodextrin derivatives and N,N'-dimethylurea as new solvents for biphasic organometallic catalysis**

*Rhodium-catalyzed hydroformylation reaction, Palladium-catalyzed cleavage of allylcarbonates, RAME-β-CD, Recyclability*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 29

Núñez-Delicado, E.; Gabaldón, J. A.; Pellicer, J. A.; Rodríguez, M. I.; Lucas-Abellán, C.; Franco, E.; Pérez, L. M.; Ferrandiz, M.; Cosme, P.; Fini, P.

**P6 : Dyes removal from waste water by means EPI-γ-CDs polymers**

*Reaction of CDs with epichlorohydrin, Direct Red*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 84

Paola, L. M.; Francesco, T.; Caldera, F.; Maurizio, F.

**P53 : Cyclodextrin nanosponges as flame retardant for polymers**

*N,N-diglycidyl-4-glycidyoxyaniline, Pyromellitic anhydride, Triethylphosphate, Combustion behaviour*

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Potier, J.; Menuel, S.; Lyskawa, J.; Fournier, D.; Stoffelbach, F.; Monflier, E.; Woisel, P.; Hapiot, F.

**P34: Thermoresponsive self-assembled cyclodextrin-end-decorated PNIPAM for aqueous catalysis**

*Co- and Rh-hydroformylation of olefins, Pickering emulsions O/W, Hydroformylation of 1-decene and 1-hexadecene*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 112

Scalarone, D.; Caldera, F.; Trotta, F.; Malandrino, M.; Jadhav, S. A.

**FP12 : Synthesis and metal ion complexation properties of a hyper-branched β-cyclodextrin polyester**

*Pyromellitic dianhydride, Ca<sup>2+</sup>, Mg<sup>2+</sup>, Fe<sup>2+</sup>, Mn<sup>2+</sup>, Ni<sup>2+</sup>, Ce<sup>4+</sup>, Wastewater decontamination, Sensors for ion recognition, Electrospinning*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 46

Semeraro, P.; Fini, P.; Rizzi, V.; Agostiano, A.; Matera, S.; Franco, E.; García, R.; Ferrándiz, M.; Núñez, E.; Gabaldón, J. A.; Fortea, I.; Pérez, E.; Ferrándiz, M.; Cosma, P. P.



**P65 : Use of cyclodextrins for the recovery and reuse of textile dyes**

*Direct Yellow 106, Direct Red 83:1, Removal of colour from real textile wastewater, HP- $\beta$ -CD, TRIMEB*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 144

Zanetti, M.; Anceschi, A.; Caldera, F.; Magnacca, G.; FrancescoTrotta

**O33 : Cyclodextrin nanosponges as precursor for porous activated carbon material**

*Definite porosity, Micropores, Micropore size distribution, Molecular sieve carbon, Affinity to CO<sub>2</sub>*

4th European Conference on Cyclodextrins - Book of Abstracts, 2015, 68

Zang, Y. N.; Markenstein, L.; Wenz, G.

**P4 : Stable supramolecular attachment of cyclodextrin monolayers onto a PDMS surface**

*Polydimethylsiloxane, Amphiphilic protein hydrophobin, Sequential adsorption of polyelectrolytes via layer-by-layer deposition, Water contact angle, Polyanionic  $\beta$ -CD hyaluronamide, 6-(p-Toluidino)-2-naphthalinsulfonate*

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## 7. CDs in Sensing and Analysis

Becuwe, M.; Danjou, P.-E.; Cazier, F.; Woisel, P.; Delattre, F.

**FP9 : Immobilization of fluorescent chemosensor on pyrogenic silica: A promising device for gaseous detection**

*Cyclodextrin-based fluorescent chemosensor, Quaternization, Toluene detection*

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Duarte, L.; Nag, S.; Castro, M.; Bennevault-Celton, V.; Feller, J.-F.; Guégan, P.

**P9 : New CD and (Z)-octadec-9-enedioic acid-based polyamides compared to supramolecular assemblies of functionalized cyclodextrins for chemical sensors applications**

*Conductive polymer nanocomposites, Volatile organic solvent, Polycondensation, Hyperbranched polyamides, CD-based polymer library, Adamantane residue*

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Sappei, C.; Estour, F.; Suzenet, F.; Gouhier, G.

**P44 : New cyclodextrin scaffolds to answer the challenges of new contrast agents development**

*Magnetic resonance imaging, Relaxivity, Pyridine carboxylate and phosphonate ligands*

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Wajs, E.; Nielsen, T. T.; Larsen, K. L.; Fragoso, A.

**P64 : Cyclodextrin-based stimuli-responsive nanocapsules with smart redox/light switching properties**

*Gold nanoparticles, Rhodamine B*

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