

Functionalized polysaccharides for applications in biomedicine and biotechnology

- [Description](#)
- [Results](#)
- [Team](#)
- [Links](#)
- [Contact](#)

Project code

PN-II-PT-PCCA-2011-3.1-087

Contract number

PN-II-PT-PCCA-2011-142

Founding source

UEFISCDI

Project title

Functionalized polysaccharides for applications in biomedicine and biotechnology

Acronym

BIOPOLIZAH

Project description

General objectives -The general objective of the BIOPOLIZAH project is to develop original and highly efficient strategies to allow functionalization (at preparative scale) of long chain, polydisperse mixtures of polysaccharides with functional groups such as aromatic amines, oligopeptides and chromophores, followed by detailed analysis of the coupling products using the most advanced glycoscreening and sequencing methods based on high performance mass spectrometry (MS), microfluidics technology and robotics for sample infusion into MS.

Expected results

The expected results of the project are to develop, show the feasibility, bring a proof a principle and finally standardize:

- novel methods for coupling with a variety of functional groups of complex mixtures of long chain polysaccharides

- novel glycoscreening and sequencing methods by most advanced microfluidics-MS techniques

- bioinformatics platforms to allow automatic data interpretation and characterization of the coupling products, monitoring of the functionalization and acquisition of new knowledge in the field of glycan synthesis.

Duration and budget

Duration: 23/07/2012-01/07/2016

Budget: 2.000.000,00

Scientific Authority

UEFISCDI

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Partners

Institutul National de Cercetare-Dezvoltare pentru Electrochimie si Materie Condensata Timisoara

Articles

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12) R.M. Ghiulai, M. Sarbu, C.Ilie, A.D. Zamfir A straightforward electrospray ionization high resolution mass spectrometry method for underivatized long chain polysaccharides *Open Chemistry*, 2015,13(1), 32-41

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1) Alamäe, T.; Visnapuu, T.; Mardo, K.; Mäe, A.; Zamfir, A.D. Fructooligosaccharides and heterooligofructans. *Carbohydrate Chemistry: Chemical and Biological Approaches*, RSC- Royal Soc. Chem. Publishing (book chapter) U.K., July 2012, 38, 176-191.

2)M.Sarbu, A.D.Zamfir *Nanofluidics-Based Mass Spectrometry. Applications for Biomarker Discovery in Lysosomal Storage Diseases* in: "Nanoparticles: Promises and Risks", Ed. Springer, Germania, 2014, pp 137-165; ISBN: 978-3-319-11727-0 (Print) 978-3-319-11728-7 (Online);

3) Zamfir AD *Nanochips for Mass Spectrometry and Applications in Biomedical Research* in: "RESEARCH HORIZONS OF NANOSYSTEMS STRUCTURE, PROPERTIES AND INTERACTIONS", Apple Academics, Ontario-New Jersey, Canada-USA, pp.386-443; ISBN: 978-1-926895-90-1, 2014

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- 3) C.Flangea,C.Schiopu, F.Capitan, D.Seidler, E.Sisu,Alina D. Zamfir Determination of decorin chondroitin/dermatan sulfate expression in human embryonic kidney cells by fully automated chip-based nanoelectrospray mass spectrometry- International Symposium Research and Education in Innovation Era, 8-9 Nov. 2012, Arad, Romania
- 4) C. Flangea, D.G. Seidler, E. Sisu, A.D. Zamfir Identification of unusually sulfated tetra- and hexasaccharides in mouse brain proteoglycans by chip-nanoelectrospray collision-induced dissociation ms2-ms4 - 6th Central and Eastern European Proteomic Conference 14-17th October 2012, Budapest , Hungary
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- 7) C.Pascariu, A. Gruia, C. Neanu, M.Rafaila, L.M.Rusnac, E.N.V. Sisu - Structure determination of sugar monoStructure mono- and diacetal derivatives through GC-EI-MS combined with computational chemistry - Zilele Academice Timisene, ed. XIII- Noi tendinte si strategii în chimia materialelor avansate cu relevantă în sisteme biologice, tehnică si protectia mediului 13-14 iunie 2013, Timisoara, Romania
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- 9) C.Schiopu,F.Capitan,Z.Vukelic,E.Sisu,A.Zamfir – Deciphering the composition and structure of glycolipids in human meningioma by advanced mass spectrometry-Zilele Academice Timisene, ed. XIII-Sectiunea medicina, 23 Mai,2013,Timisoara,Romania
- 10) Roxana M. Ghiulai, Mirela Sarbu, Ioana Sisu, Eugen Sisu, Alina D. Zamfir QTOF TANDEM MS FOR THE ANALYSIS OF DERIVATIZED AND UNDERIVATIZED OLIGOSACCHARIDES , 2nd Middle Eastern and Mediterranean Sea Region Countries Mass Spectrometry Conference, 30 iunie-4 iulie, 2013, Siena, Italy
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- 14) I.Șișu, L.Božin, M.Georgescu, A.Șerb, L.Rusnac, E.Șișu, „Analysis of maltodextrin derivatives through HCIT-MS“, A XXXIII-a Conferință Națională de Chimie, 1-3 octombrie 2014, Căciulata, România;
- 15) C.Neanu, L.Božin, A.Gruia, M.Pascariu, A.Șerb, A.Dragomirescu, E.Șișu, „GC-MS analysis of amino alditol diacetals“, A XXXIII-a Conferință Națională de Chimie, 1-3 octombrie 2014, Căciulata, România;
- 16) M.Pascariu, M.Rafailă, A.Gruia, M.Medeleanu, M. Rusnac, E.Șișu, „Mass spectrometry and computational chemistry. 1. Long bonds in radical cations and anchimeric assistance as possible routes in EI-MS fragmentation of some glycoderivatives“, MolMod 2014 - Molecular Modeling in Chemistry and Biochemistry, 13-15 noiembrie 2014, Cluj-Napoca, România;
- 17) A.Serb, A.Dem, M.Georgescu, E.Sisu, L.Zagreanu, A.Zamfir, “Neurolipidomic studies about carbohydrate-linked lipids from biological matrices using advanced mass spectrometry techniques”, The Conference of the National Neuroscience Society of Romania 2014, SNN 2014 Bucuresti, 23-25 Octombrie 2014;
- 18) C.Mosoarca, T .Visnapuu, T. Alamae, A.D.Zamfir Chip-based mass spectrometry of oligosaccharides produced by levansucrases from *Pseudomonas syringae* pv. tomato and *P. chlororaphis* subsp. aurantiaca 2nd Biotechnology World Congress, Dubai, UAE, 10-13 Februarie, 2014
- 19)M. Sarbu, R. M. Ghiulai, A.D. Zamfir Electrospray ionization tandem mass spectrometry of underivatized dextrans MassSpec-Forum-Vienna-2014, 17-19 Februarie 2014, Viena, Austria
- 20) M.Sarbu, R.M.Ghiulai, A.D. Zamfir A nanoESI-QTOF MS approach for screening and sequencing of underivatized dextran chains containing up to 35 glucose repeats 20th International Mass Spectrometry Conference; 24-29 August 2014, Geneva, Elvetia
- 21) C. Mosoarca, A.D.Zamfir Introduction of chip-based nano-electrospray mass spectrometry with electron transfer /collision induced dissociation in glycoproteomics 20th International Symposium on Analytical and Environmental Problems, 22-23 Septembrie 2014, Szeged, Hungary
- 22) C. Mosoarca, I. Malaescu, Ž. Vukelić, A.D.Zamfir, A. Ercuta Introducing 2D numerical analysis in modeling of complex carbohydrate mass spectra TIM-FIZ 2014 "Physics without Frontiers", Conferinta Internationala de Fizica, 20-22 Noiembrie 2014, Timisoara, Romania

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