**OKSANA KOLOMITSYNA– SENIOR RESEARCH SCIENTIST – CV**

(last updated March 2020)

**Address:**

Natural Resources Research Institute

University of Minnesota Duluth

5013 Miller Trunk Hwy, Duluth, MN 55811

**Phone:** (218) 788-2727

**e-mail:** okolomit@d.umn.edu

**Education**

* September 1993 - October 1995: M.S. Organic Chemistry and Chemical Engineering, National Technical University of Ukraine (Kiev Polytechnic Institute), Kiev, Ukraine.
* September 1989 - October 1993: B.Sc. Organic Chemistry, National Technical University of Ukraine (Kiev Polytechnic Institute), Kiev, Ukraine.

**Professional Experience**

* Senior Research Scientist (2016-present) UMN-NRRI, Duluth, MN, Wood Products, Materials and Bio-economy. Responsibilities included in providing product, process, and business concept research and development services to entrepreneurs, organizations, and agencies associated with the natural products and natural resources sectors.
* Research Associate **(**2003- 2016) UMN-NRRI, Duluth, MN, CARTD, Chemical Extractives. Responsibilities included performing biomass processing and conversion for production value-added compounds, renewable fuel processing or industrial wastes.
* Research Specialist (1997-2003) UMN-NRRI, Duluth, MN, CARTD, Chemical Extractives.

 Responsibilities included performing the bench top and scale-up studies in multiple stage chemical

 processing of bio-active compounds

* Chemist Engineer (1995-1997) Station of Water Purification and Preparation, Shepetivka, Ukraine

 Responsibilities included evaluation of plant operating performance, and training the personnel of the

 facilities in Ukraine.

**Membership in Professional Societies, Faculties, Editorial Committees**

* American Chemical Society (ACS), divisions of Organic chemistry and Analytical chemistry: 2007 – present.

 **Distinctions**:

* 09/2014 University of Minnesota Inventor Recognition Award.
* 09/2011 University of Minnesota Inventor Recognition Award.
* 09/2009 University of Minnesota Inventor Recognition Award.
* 04/2007 Outstanding researcher award; awarded to acknowledge exemplary work in research at the University of Minnesota.

**Publications**

**Articles:**

1. Teresa L Serafim, Philipa S. Carvalho, Telma C Bernardo, Gonçalo C. Pereiraa, Edward Perkins, Jon Holy, Dmytro A. Krasutsky, **Oksana N. Kolomitsyna**, Pavel A. Krasutsky, Paulo J. Oliveira “New derivatives of lupane triterpenoids disturb breast cancer mitochondria and induce cell death.” Bioorganic & Medicinal Chemistry 22 (21), 6270-87, November 1, **2014**.
2. Telma C Bernardo, Teresa Cunha-Oliveira, Teresa L Serafim, Jon Holy, Dmytro Krasutsky, **Oksana** **Kolomitsyna**, Pavel Krasutsky, Antonio M Moreno, Paulo J Oliveira “Dimethylaminopyridine derivatives of lupan triterpenoids cause mitochondrial disruption and induce the permeability transition.” Bioorganic & Medicinal Chemistry 21 (23), 7239-49, December 8, **2013.**
3. Dorr CR, Yemets S, **Kolomitsyna O,** Krasutsky P, Mansky LM. **“**Triterpene derivatives that inhibit human immunodeficiency virus type 1 replication.” Bioorganic & Medicinal Chemistry Letters, 21(1), 542-545, January 1, **2011.**
4. Holy J, **Kolomitsyna O**, Krasutsky D, Oliveira PJ, Perkins E, Krasutsky PA “Dimethylaminopyridine derivatives of lupan triterpenoids and potent distruptors of mitochondrial structure and function.” Bioorganic & Medicinal Chemistry 18 (16), 6080-6088, August 15, **2010**.

**Patents:**

1. Avilov, Dmytro; Krasutskyy, Dmytro A.; **Kolomitsyna, Oksana;** Sergeeva, Tatiana; Krasutsky, Pavel A. Triterpene Quaternary Salts as Biologically Active Surfactants. Australian Patent 2003/205244, January 8, **2009**.
2. Krasutsky, Pavel A.; Avilov, Dmytro; Sergeeva, Tatiana; Krasutskyy, Dmytro A.; **Kolomitsyna, Oksana**. Triterpene Quaternary Salts as Biologically Active Surfactants. European Patent 1465914, December 17, **2008**.
3. Krasutsky, Pavel A.; Avilov, Dmytro; Sergeeva, Tatiana; Krasutskyy, Dmytro A.; **Kolomitsyna, Oksana**. Triterpene Quaternary Salts as Biologicaly Active Surfactants. United States Patent 7,410,958, August 12, **2008**.
4. Krasutsky, Pavel A.; Avilov, Dmytro; Sergeeva, Tatiana; Krasutskyy, Dmytro A.; **Kolomitsyna, Oksana**. Triterpene Quaternary Salts as Biologically Active Surfactants. United States Patent 7,199,114, April 3, **2007**.

**Patents applications:**

1. **Kolomitsyna; Oksana**; Young; Matthew; Hagen; Timothy; Fostnacht; Donald; Singsaas; Eric. Fuel Compositions Based on Binders from Cutin-Containing Materials. United States Patent Application 20190316050 A1, October 17, **2019**
2. **Kolomitsyna; Oksana**; Young; Matthew; Hagen; Timothy; Fostnacht; Donald; Singsaas; Eric. Fuel Compositions Based on Binders from Birch Bark. United States Patent Application 20190316052 A1, October 17, **2019**
3. Krasutsky, Pavel A.; Kolomitsyn, Igor V.; Holy, Jon M.; Perkins, Edward Leon; Packee, Edmond C.; **Kolomitsyna, Oksana**. Therapeutic Triterpenoids. US Patent Application 20090136566, May 28, **2009**.
4. Krasutsky, Pavel A.; **Kolomitsyna, Oksana**. Methods of Manufacturing Bioactive 3-Esters of Betulinic Aldehyde and Betulinic Acid. United States Patent Application 20090023698, January 22, **2009**.
5. Krasutsky, Pavel A.; Kolomitsyn, Igor V.; Holy, Jon M.; Perkins, Edward Leon; Packee, Edmond C.; **Kolomitsyna, Oksana**. Therapeutic Triterpenoids. International Patent Application WO/2007/121352 A3R4, August 28, **2008**.
6. Krasutsky, Pavel A.; Avilov, Dmytro; Sergeeva, Tatiana; Krasutskyy, Dmytre A.; **Kolomitsyna, Oksana**. Triterpene Quaternary Salts as Biologically Active Surfactants. United States Patent Application 20070259842, November 8, **2007**.
7. Krasutsky, Pavel A.; Avilov, Dmytro; Sergeeva, Tatiana; Krasutskyy, Dmytre A.; **Kolomitsyna, Oksana**. Triterpene Quaternary Salts as Biologically Active Surfactants. United States Patent Application 20070259839, November 8, **2007**.
8. Krasutsky, Pavel A.; Kolomitsyn, Igor V.; Holy, Jon M.; Perkins, Edward Leon; **Kolomitsyna, Oksana**. Therapeutic Triterpenoids. International Patent Application WO/2007/121352, October 25, **2007**.
9. Krasutsky, Pavel A.; Avilov, Dmytro; Sergeeva, Tatiana; Krasutskyy, Dmytre A.; **Kolomitsyna, Oksana**. Triterpene Quaternary Salts as Biologically Active Surfactants. United States Patent Application 20070244081, October 18, **2007**.
10. Krasutsky, Pavel A.; **Kolomitsyna, Oksana**. Methods of Manufacturing Bioactive 3-Esters of Betulinic Aldehyde and Betulinic Acid. International Patent Application WO/2006/105356, October 5, **2006**.
11. Krasutsky, Pavel A.; **Kolomitsyna, Oksana**; Krasutskyy, Dmytro, A.; Kacharov, Oleksiy, D.; Kolomitsyn, Igor, V. Method for Obtaining Natural Products from Plant Material. International Patent Application WO/2005/047304, May 26, **2005**.
12. Krasutsky, Pavel A.; Avilov, Dmytro; Sergeeva, Tatiana; Krasutskyy, Dmytro A.; **Kolomitsyna, Oksana**. Triterpene Quaternary Salts as Biologicaly Active Surfactants. United States Patent Application 20050059642, March 17, **2005**.
13. Krasutsky, Pavel A.; Avilov, Dmytro; Sergeeva, Tatiana; Krasutskyy, Dmytro A.; **Kolomitsyna, Oksana**. Triterpene Quaternary Salts as Biologicaly Active Surfactants. International Patent Application WO/2003/062260, July 31, **2003**.

 **Technical and Data Reports:**

1. G. Hudak, L. Estepp, P. Schoff, J. Hanson, B. Hanson, S. Hanson, M. Sadowsky, R. Hicks, D. Jones, T. Löesekann, S. Huang, W. Scherkenbach, T. Ferguson, M. Haynes, G. Chiodi Grensing, T. Eisenbacher, A. Burke, K. Haedtke, and **O. Kolomitsyna**. “The MnDRIVE Transdisciplinary Project Implementation of Smart Bioremediation Technology to Reduce Sulfate Concentrations in NE Minnesota Watersheds”. Natural Resources Research Institute, University of Minnesota Duluth, Technical Report NRRI/TR-2017/17 Date: July 14, 2017.

 **Conferences and Workshops Attended:**

 1. GLCE Annual Meeting (Great Lakes (Region V) Regional center for Excellence in Biodefense and Emergency Infectious Disease Research), Hilton Head, NC, December 2006.

#  Invited Presentations:

1. **Kolomitsyna, O**., Missiakis, D., Krasutskyy, D., Schneewind, O., Krasutsky, P., “Triterpenes and their derivatives against B.Anthracis and Staphylococcus Aureus”. Seminar at the GLCE Annual Meeting (Great Lakes (Region V) Regional center for Excellence in Biodefense and Emergency Infectious Disease Research), Hilton Head, NC, December 2006.

 **Technical Research and Environmental Assessment Skills:**

 During my appointments at the University of Minnesota Duluth, I have gained experience in natural products and medicinal chemistry. Some of these skills include:

 Chemistry of Natural Products:

* extraction, separation, purification and structural elucidation of organic compounds isolated from natural sources;
* green and sustainable separation of natural products from forest and agro-industrial waste;
* production of high-value products from biomass;

 Medicinal Chemistry:

* preparation of novel compounds by synthetic chemistry
* interpretation of structure- activity relation data to see which compounds and synthetic pathways to pursue for new therapies;

 Experimental Laboratory skills:

* operation of SEM, HPLC, GC/MS, LC/MS, IR and NMR instrumentation, and interpretation of generated data for the analysis and characterization of organic molecules;
* design and execute experimental protocols, perform laboratory-based development experimentation and prepare internal reports;
* computer applications used for literature searches and journal/ patent writing (SciFinder (CAS), ACS, Beilstein, ChemDraw, Adobe Acrobat, Mnova, Excel);
* formulate/enforce lab safety policies and assist in regulatory inspections;
* aid with training and supervision of newcomers;
* present results at meetings and conferences.

**Main Research Endeavours**

My research interests focus on developing green and sustainable technologies to convert forest and agricultural biomass to value-added materials. I have been involved in a number of projects that required knowledge in physical, chemical and biological science to fulfill this task. The following are examples of my project involvement over the last ten years.

1. ***Birch bark value added chemicals.***

In collaboration with NaturNorth Technologies, LLC we developed sustainable technology for birch bark processing. This technology was optimized for pilot and industrial scale equipment. It allows us to extract from outer birch bark and purify great amount of following natural compounds: betulin, lupeol, betulinic acid, betulone, betulonic acid, allobetulin and omega-hydroxy fatty acids.

A library of birch bark triterpene samples for biological tests was created (nearly 400 samples).

In collaboration with Institute for Molecular Virology(UMN) new triterpene derivatives that inhibit human immunodeficiency virus type 1 replication were discovered and tested.

In collaboration with Medical School (UMD) and Center for Neuroscience and Cell Biology (University of Coimbra, Portugal) new triterpene derivatives that disturb breast cancer mitochondria were discovered and tested.

**2. *Sulfate water treatment technologies***

In 2016 I commenced at MnDRIVE Interdisciplinary Project Implementation of Smart Bioremediation Technology to Reduce Sulfate Concentrations in NE Minnesota Watersheds. The project team includes a steering committee that consists of representatives from the UMD, Labovitz School of Business and Economics, UMD, Electrical Engineering and UMTC, Biotechnology Institute, Clearwater Layline, LLC and UMD, Natural Resources Research Institute. The project aims were to design, build, and operate bioremediation platforms that could be used to decrease aqueous sulfate concentrations at remote sites, to evaluate their functional and economic efficiency, and to determine whether and how they might be used in their current or modified form. Essentially, these bioremediation platforms were continuous-flow systems that brought high-sulfate water into contact with bacteria that converted sulfate into reactive hydrogen sulfide, which was then chemically treated to form insoluble elemental sulfur precipitates that could be removed from the system.