**Chair Message**

Greetings from the faculty, staff, and graduate students of the Department of Coatings and Polymeric Materials! We are excited to bring you this Fall 2018 newsletter so that we can bring you up to date on all of the exciting things that have been happening in the department since our previous newsletter. Even in the midst of severe budget cuts from the state, the department is thriving and was able to hire two additional faculty members, bringing our total up to eight. This is the largest number of faculty the department has had in its history and we are grateful that the university administration has supported our growth. You will read more about Dr. Bakhtiyor Rasulev, working in the area of computational materials science and Dr. Ghasideh Pourhashem, working in lifecycle assessment and technoeconomic analysis. Our students are highly sought after by the industry and, while we always hate to see them leave the department, we are always excited about seeing them go forward with their future careers. Keep reading to learn about all the exciting goings-on in the department.
New Faculty Member – Dr. Bakhtiyor Rasulev

The department is pleased to welcome Dr. Bakhtiyor Rasulev, who joined CPM in January of 2017 as a tenure-track Assistant Professor. This is a new position for the department that came about as part of the NSF EPSCoR program which is designed to help build research infrastructure at the universities in ND. Dr. Rasulev has a PhD in Chemistry (2002) from the Uzbek Academy of Sciences. He was working as a postdoctoral researcher and then as a research professor at Interdisciplinary Center for Nanotoxicity (JSU, Jackson, MS), directed by Prof. Jerzy Leszczynski. Dr. Rasulev’s research covers a range of topics in structure-activity relationship studies dealing with biological activity prediction, physico-chemical and toxicity of various organic and inorganic compounds, polymers, and nanomaterials. Dr. Rasulev’s research group is also involved in design of novel bio-based polymeric materials. The group applies computational chemistry, cheminformatics, and data mining methods in structure-property relationship modeling and materials design.

New Faculty Member—Dr. Ghasideh Pourhashem

The department is pleased to welcome Dr. Ghasideh Pourhashem, who joined CPM in November of 2017 as an assistant professor. She also works for NDSU’s Center for Sustainable Materials Science (CSMS) and a nonresident scholar at Rice University’s Baker Institute for Public Policy. Prior to joining CPM and CSMS in 2017, She spent 3 years at Rice University’s Baker Institute for Public Policy (Center for Energy Studies) and Department of Earth, Environmental and Planetary Sciences as a postdoctoral fellow. She Obtained her PhD in environmental engineering at Drexel University and her masters and undergraduate degree in chemical and environmental engineering at Sharif University of Technology. Dr. Pourhashem currently serves on the editorial advisory board of GCB Bioenergy Journal and the advisory board of the U.S. Biochar Initiative.

SURE Program

This summer, our department welcomed four Summer Undergraduate Research Experience (SURE) students. The SURE program is operated by the Coatings and Polymeric Materials Department at NDSU to provide junior and senior students the opportunity to experience a research environment and motivate them to pursue a higher degree. Each of the students works with a supervisor to help guide them with their work. Autumn Fuchs was supervised by Eric Krall, Amanda Lee was supervised by Dr. Rasulev and Dr. Pourhashem, Hermella Eshete was supervised by Zoriana Demchuk and Dr. Rasulev, and D’Andra Moxey was supervised by Rivimbo Chitemere. The students were here for a ten-week period during which they were active participants in the department. All students are required to present their research findings to the department at the end of the program.

From Left to Right: Autumn Fuchs (College of Saint Benedict), Amanda Lee (Minnesota State University Moorhead), Hermella Eshete (University of Southern Mississippi), and D’Andra Moxey (Fisk University)
NDSU HOSTS 3RD ISMR

NDSU hosted the third International Symposium on Materials from Renewables July 17-18. The event was co-organized by faculty at NDSU and the University of Georgia. The symposium is sponsored by the North Dakota Experimental Program to Stimulate Competitive Research, known as ND EPSCoR. The event explored aspects of research related to the use of renewable, natural materials. This includes applications in all fields of science and engineering. The symposium is an important platform to discuss bio-based materials, a growing area of development as researchers and industries seek alternatives to petroleum-based products.

NDSU members of the organizing committee included Andriy Voronov, Dean Webster, and Mukund Sibi. A distinguished group of speakers addressed research, processing and application for making materials from renewable resources, such as natural polymers and plant or vegetable oils. The conference provided opportunities for students to hear from top scientists who are working on emerging research. Poster presentations gave students an opportunity to discuss their research with conference attendees.

The symposium is an annual event, rotating between the NDSU and University of Georgia campuses. As a student-focused, land-grant, research university, we serve our citizens. For more details, please visit https://www.ndsu.edu/conferences/ismr/

Congratulations to NDSU student Zoriana Demchuk, visiting scholar Vasyllyna Kirianchuk, and NDSU student Eric Krall for winning the Best Poster award. Also pictured are Prof. Sergiy Minko, University of Georgia, Dr. Sylvain Caillol, Montpellier University, France, and Janiet Tardiff, Ford Motor Company.

2018 SHORT COURSE

Every year we run our NDSU short course usually during the first complete week in June. It starts on Sunday evening with a general introduction and finishes at noon on the following Friday. This year some scheduling issues pushed it back a week later. Nevertheless, we had great attendance from a variety of companies, government agencies, and countries. As usual, most of the teaching was done by Prof. Webster and Prof. Croll, but they were assisted by by three instructors from industry. Dr. Ramesh Kumar from Clarant talked about colored pigments and dispersion. Dr. Stuart Lipskin from Byk (Altana) dealt with all the different types of additives (wetting agents, dispersants, defoamers, etc.) and defect control. Dr Alan Ekin of Covestro took over the instruction on epoxy and polyurethane chemistries when Dr. Rick Roesler (Covestro retired) could not help us this year. Dr Ekin is also a NDSU CPM alumnus. Although Profs. Webster and Croll have a lot of industrial experience in their careers, these external instructors bring much appreciated real world input to the classes. Everyone seemed to enjoy the experience although the NDSU short course is an intense week of wide ranging discussions of coating science. In truth, the instructors feel it just as much as the students.

Typically, we get an invitation to take the short course to a company site so that the company may have more employees in the classes. The company selects the lesson topics that seem to be the most useful, and we schedule those lessons to minimize the time away from normal work at the company. Last year we went to Rust Oleum, with about 30 people in the classes. In 2018, Profs. Webster and Croll took the short course on the road to Eastman Chemicals in Tennessee. There, we had about 50 people from Eastman sign up for our classes.
NDSU-KU Symposium in Kagoshima, Japan

The department has been participating, along with the Chemistry department, in a joint symposium between NDSU and Kagoshima University in Japan. Kagoshima is on a southern island with an active volcano nearby. This fall, it was Kagoshima’s turn to host the symposium and we were able to bring along six of our graduate students to participate in the two-day symposium.

A further highlight of the trip was that after the symposium we got to participate in the Kagoshima Oharu Festival, the world’s largest dance festival. Our hosts taught us the steps to the three traditional dances featured at the festival and so we were able to (try to) follow along with everybody else as we were dancing down the street. We even made the local newspaper!

Students interacted by giving poster presentations in addition to formal presentations. NDSU students Alison Rohly and Jackson Benda won best poster prizes!
Rasulev’s Group Hosts Scientists from Croatia, Slovenia, Ukraine and Poland

To boost the group’s research activities, Dr. Rasulev has established collaboration with scientists from Croatia, Slovenia, Ukraine and Poland. Thus in 2017, Dr. Oleksii Antypenko, from Zaporozhe Medical University (Ukraine), worked for three months as a visiting scholar in Rasulev’s group. He was involved in modeling of amphiphilic irreversible polymeric nanomaterials (AIPNs) by quantum chemical and molecular dynamics (MD) methods. Graduate student Matija Cvetic, from University of Zagreb (Croatia), visited the group in July 2017 for two weeks. He was working on modeling of wastewater pollutants degradation. One year later in July 2018, Matija again visited the group, but this time with his advisor, Prof. Hrvoje Kusic. They were at NDSU for one month, finishing the project and then submitting a manuscript to a journal. Dr. Natalja Fjodorova from National Institute of Chemistry (Ljubljana, Slovenia) visited the group in August 2017, to establish a collaboration in nanomaterials toxicity research area. A new bilateral US-Slovenia proposal for funding was submitted in September 2017 as a result of continuous collaboration. One more visiting scholar, Dr. Alicja Mikolajczyk from University of Gdansk (Gdansk, Poland) visited the group from January-February 2017. She came to discuss a collaboration and start a new project in the area of structure-property relationship methodology development for various materials, including polymeric materials. All visiting scientists enjoyed working at CPM and expressed a willingness to strengthen a collaboration between groups and continue to do exchange visits.

Symposium at 255th National American Chemical Society

Dr. Voronov and Dr. Rasulev organized a symposium named “Recent Advances in Particulate & Colloid Materials for Biomedical Applications” within COLL Division at 255th National American Chemical Society in New Orleans, LA (March 18-22, 2018).

Rasulev Visits Slovenia and Ecuador to Give Presentations

On October 19, 2017 Dr. Rasulev had the opportunity to give a presentation at the National Institute of Chemistry (Ljubljana, Slovenia) during a prestigious Pregl colloquium with the title: “Adaptation and Application of Cheminformatics Methods in Toxicity Assessment of Nanomaterials”. The talk was a discussion of the computational methods in properties predictions for polymeric materials and nanomaterials. In July 2018, Dr. Rasulev was invited to give two plenary talks during Nanoscience Summer School held at Yachay University in Ecuador.

Rasulev Received Prestigious National Science Foundation (NSF) Grant

Dr. Bakhtiyor Rasulev is being awarded a grant in the amount of $468,030 from the National Science Foundation for a project devoted to investigating and designing organometallic materials with nonlinear absorption and near-infrared emission properties. He is the PI on the project with Profs. Wenfang Sun, Dimitri Kilin and Svetlana Kilina as coPIs.

Three New Graduate Students Joined the Rasulev Group in Fall 2018

The new members include two CPM program students – Meade Erickson and Anas K., as well as one BME program student – Kweeni Iduoku. They all will be working on modeling the properties of various polymeric materials.
CROLL RESEARCH GROUP

Dr. Croll has been teaching and conducting research among other things at NDSU since he came to the department in 2000. He has had the opportunity to contribute to art conservation when conservators in museums and galleries around the world have looked for collaboration with experts in coating science. Dr. Croll continues to teach physical coatings science, including polymer physics and some color and appearance. He remains on the Lab Safety Committee for the university and has been on other ad hoc committees for the College of Science and Mathematics.

His research has also at times focused more on the physical science side of coatings technology. One such project, that is overseen by Boeing for the Dept. of Defense, has a goal of developing new accelerated testing procedures that include mechanical stress as well as the other environmental factors more commonly found in such testing. The objective is to emulate the cracking found in sealants and coatings over gaps when aircraft undergo major maneuvers during take-off and landing. Luna Innovations are also part of the project, their contribution is to design and place electrochemical sensors between coating layers to understand how the coating system is behaving. Aaron Feickert was working on the project before graduating with his doctorate. His work produced publications on the mechanical stresses in multilayer coatings around gaps and on the amount of water that diffuses into multilayer coatings when exposed to many wetting and drying cycles. His progress will be continued by Mary Hedrick, a graduate student in CPM.

The interest in pipeline coatings continues. A project funded by 5 companies and managed by Northwest Pipe Inc. who manufactures large diameter water pipelines that are usually buried. The aromatic polyurethane coatings have been exposed for 2 years in Florida and Texas. They have lost their gloss, have yellowed and in some cases chalked, but they are thick enough to still provide substantial corrosion barrier protection against ground water.

Dr. Croll and Dr. Kroll (retired from the Physics department at NDSU) are collaborating, doing computer simulations on the defects that arise from the statistical nature of crosslinking reactions. This has produced several publications and presentations; the current focus is on whether those defects produce a pathway through the coating and how that depends on the degree of conversion. Dr. Croll is still trying to understand the physical aspects of coatings’ durability and has learned more than he ever anticipated about how extreme environment statistics might be useful in describing how coating properties deteriorate in service. He recently published a review of knowledge he found in other disciplines about how polymer composition might influence whether electrolyte ions can penetrate a coating and thus corrode the metal underneath. Another, current interest is to try and understand how or why the surface profile on a metal has an impact on coating adhesion and whether there is any commonality between adhesion and the spread of corrosion underneath the coating.

Dr. Croll is on the organizing committee of the Coating Science International (COSI) conference that meets every year in the Netherlands. He would like you to remember that it is probably the most scientific of all the annual meetings about coatings, and that you should consider attending.
AMERICAN COATINGS SHOW 2018

On April 9-11, 2018 the CPM department traveled to The American Coatings Show in Indianapolis, IN to have a booth at the trade show. Janice Hanson manned a booth while Chunju Gu attended the conference when not also assisting with the booth. In conjunction to the ACS, the Americans Coatings Conference was also held. Several faculty and students attended the conference as well as the show.

“Both the show and the conference have earned a reputation for being must-attend events for coatings industry professionals. From technical and sales professionals to university professors and top-level decision makers, the ACS and ACC have always provided the inside track on future trends and latest developments in coatings industry.”

CROSSING BOUNDARIES: SCIENCE, CAMOUFLAGE AND ART

PhD student Sammy Uzelac spent this summer completing a journeyman fellowship at the Army Research Lab in the Aberdeen Proving Ground. She worked with the Camouflage, Coatings, and Corrosion Team lead by John Escarsega. The projects were focused on Chemical Agent Resistance Coatings (CARC) or camouflage based coatings systems that the Department of Defense uses on many of their assets such as ground, air, and related support equipment. These hybrid coatings have many attributes that meet the necessary requirements for military use. They not only provide camouflage properties, though they are resistant to many chemicals, they also provide corrosion resistance on a variety of substrates.

While commonly used on military ground vehicles and air assets, the high resistance to corrosion and excellent UV durability has also found interest from the National Gallery of Art and other institutions in an effort to protect outdoor sculptures of which many are considered National Treasures. Sammy directly supported efforts in correlating structure property relationships in a design of experiment project to enhance current topcoat properties. Additional she made coating formulation that were applied to both Blackhawk helicopters blades and to an outdoor sculpture by Louise Nevelson; City on High Mountain which will be at Storm King, located near the Hudson Valley in New York. Sammy found the projects to be an “exciting challenge and was intrigued to work in a military facility.”

STAFF CHANGES

Due to budget restraints and to cover staff that either retired or left the University, the College of Science and Mathematics reorganized its staff. Kathy Backen-Andersen retired at the end of December, 2016. Lynn Stadum re-located to a different building to serve more departments, but continues to works with CPM as a Grant Coordinator. Janice Hanson joined CPM as a part-time Academic Assistant in April, 2017. She also works part-time for the Psychology Department. Ben Deetz was hired as a Business Development Coordinator in November. He will also be splitting his time between CPM and the Department of Industrial and Manufacturing Engineering.
NEW INTERNATIONAL STUDENTS EXCHANGE PROGRAM AT COATINGS AND POLYMERIC MATERIALS DEPARTMENT

In accordance with a signed Memorandum of Understanding between Lviv Polytechnic National University and NDSU, Summer Undergraduate Research Experience in USA (USURE) program for Ukrainian students has been inaugurated during summer 2018. NDSU Department of Coatings and Polymeric Materials (CPM) offers research internships for Ukrainian students in their senior year majoring food chemistry, chemical engineering and related fields as well as first- or second-year graduate students in Polymer Science/Physical Chemistry and related fields.

Two applicants, Yehor Polunin and Andrii Tiara were selected in 2018 and joined CPM for 10 weeks beginning June, 8. At their home institution, Yehor and Andrii are both studying Chemical Engineering with specialization in Organic Products Technology (Yehor) and Chemical Technologies of Food Additives and Cosmetics (Andrii). Yehor received his B.Sc. degree in 2018. Andrii is in his academic year of Master in progress. At NDSU, Yehor worked in Voronov’s research group under supervision of Zoriana Demchuk while Andrii worked under the supervision of Alison Rohly in Dr. Webster’s group. On August 3, 2018, Yehor and Andrii participated in NDSU Summer Undergraduate Research Symposium, where they presented posters entitled *Synthesis, Characterization and Miniemulsion Polymerization of High-Linoleic Soybean Oil-Based Monomer* (Yehor) and *Bio-based Epoxy Thermosets from Vanillin –Schiff bases* (Andrii).


BATTOCCHI GROUP NEWS

Dr. Dante Battocchi joined the CPM Department in January of 2016 as an Assistant Professor of Corrosion after spending more than 10 years as a Research Scientist and the Associate Director of the NDSU Center for Surface Protection. He teaches the Corrosion and Materials class and the Corrosion lab. In addition, he conducts research in the area of Corrosion, Protective Coatings and Electrochemical Testing and Evaluations; his office is located in the R1 Building, suite 172C.

Dr. Battocchi’s research focuses on the protection of non-ferrous metals, formulation of new protective coatings, corrosion inhibitors studies, and the development of new test protocols. Current group members are Dr. Xiaoning Qi, Dr. Vinod Upahdyay, Zachary Bergseth, Gwendorlene Chea, Luke Wiering, and Josh Dockter.

Dr. Qi, Gwendorlene Chea, and Josh Dockter are involved in the improvements of coatings when applied onto multi materials substrates. Dr. Upahdyay and Zach Bergseth are investigating new protection systems for Steel and performing localized studies of coatings and metal surfaces with the Scanning Kelvin Probe. Luke Wiering is studying galvanic coupling of several structural metals with the Scanning Electrochemical Microscope. Dr. Battocchi was recently invited to be a plenary speaker at Eurocorr2018, which took place on September 13, 2018 in Kracow, Poland.
Tallman’s Travels

Professor Dennis Tallman continues to enjoy retirement while maintaining some level of scientific activity. He continues to enjoy flying radio-controlled model aircraft and occasionally playing handball.

Tallman attended the XIV International Conference on Physics of Dielectrics, held May 29 to June 2, 2017, at Herzen State Pedagogical University of Russia, in Saint Petersburg, Russia. He was a coauthor with Professor Kirill Levine on a paper presented at the meeting, entitled “Studying polymer composite containing microcrystalline cellulose by electrochemical impedance spectroscopy.” Professor Levine is currently an Associate Professor in the Department of General and Technical Physics, The Saint Petersburg State Mining University, Russia’s oldest technical university, and one of the oldest technical colleges in Europe. Professor Levine was a postdoctoral student in the Tallman research group from 2003 to 2005. The photo shows Professor Levine in front of the impressive Cathedral of Our Lady of Kazan, constructed between 1801 and 1811. This large cathedral was inspired by the Basilica of St. Peter’s in Rome.

Tallman also coauthored a publication with Australian graduate student Sina Jamali, entitled “Self-healing characteristic of praseodymium conversion coating on AZNd Mg alloy studied by scanning electrochemical microscopy” (Jamali, Sina S.; Moulton, Simon E.; Tallman, Dennis E.; Zhao, Yue; Weber, Jan; Wallace, Gordon G.) in Electrochemistry Communications (2017), 76, 6-9. This publication wraps up a 20-year collaboration in electromaterials science with Gordon G. Wallace and his group at the University of Wollongong in Australia.

Tallman’s first four Ph.D. students returned to Fargo for a “First Four” reunion September 29-30, 2018. These former students, in order of completion, were Jeff Anderson, Duane Weisshaar, Dave Chesney and Steve Petersen. Left to right in the photo are Dave, Jeff, Duane and Steve. The donut-shaped symbol on their shirts represents an end-on view of a composite electrode, a blend of polymer particles (Kel-F) and conductor particles (such as graphite, gold or silver) surrounded by a sheath of polymer. These compression-molded composite electrodes were a focus of our work at that time. The reunion included watching the NDSU Bison beat the SDSU Jackrabbits in football.

GRADUATING STUDENTS

The department has had a number of graduate students complete their degrees and move on to positions in the industry. Brett Kelly completed his MS and works for a supplier in the twin cities area. Students completing their PhDs include: Teluka Galhenage, Fall 2016, Adaptive Surfaces; Junren Lin, Fall 2016, Quaker Chemical; Adlina Parmarta, Fall 2016, Telsa Motors; Arvin Yu, Fall 2017, Michelman; Madhura Pade, Spring 2018, Materia; Joseph Byrom, Spring 2018, Henzen Coatings; and Deep Kalita, Spring 2018, Renuvix.
Giving Back
The Department of Coatings and Polymeric Materials benefits greatly from the support of alumni, friends, and corporations to either the general fund or one of our many endowed scholarship funds. Gifts to the department’s general fund have an immediate impact and are used for recruiting undergraduate and graduate students, startup packages for new faculty members, upgrading instruments, seminar speakers, student activities and awards, faculty and staff development, and more. The Department also has several endowed funds towards which you can give.

Many companies have matching gift programs which may double your gift to the department.

If you would like to make a gift, you can donate online using the following link: [https://www.ndsualumni.com/college-of-science-and-math-donation](https://www.ndsualumni.com/college-of-science-and-math-donation). To designate your gift, select “Coatings and Polymeric Materials” in the Designation box.

If you would like to learn about other ways to give to the department, please contact Becky Ruthenbeck, Director of Development, (701) 231-6800 becky.ruthenbeck@ndsualumni.com

We’d Like to Hear from You
We are always interested in hearing from our alumni and friends. You can drop us a line at [nds.polycoat@nds.edu](mailto:nds.polycoat@nds.edu). If you give us permission, we can share your information in a future newsletter.

Contact Us
Give us a call for more information about our services and products

Coatings & Polymeric Materials
Box 6050, Dept. 2760
Fargo, ND 58108-6050
(701) 231-7633
NDSU.PolyCoat@nds.edu
Visit us on the web at [http://www.ndsu.edu/cpm/](http://www.ndsu.edu/cpm/)

Coatings & Polymeric Materials
Box 6050, Dept. 2760
Fargo, ND 58108-6050