SUNRISE RESEARCHERS, AREAS OF EXPERTISE

Frank Bowman, Assistant Professor of Chemical Engineering, UND
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Expertise in atmospheric aerosol research involving models for gas-particle absorptive partitioning of semi-volatile organics, methods for representing complex organic and inorganic aerosol mixtures, multi-component aerosol size distribution representations, and aerosol chamber experiments. Other areas of research interest include atmospheric chemistry, chemical reaction mechanism analysis, and coal combustion particulate matter.

Uwe Burghaus, Assistant Professor of Chemistry, NDSU
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Recent projects have focused on applications of molecular beam scattering techniques (physical chemistry, surface science, heterogeneous catalysis) and were devoted to gaining a fundamental understanding of the structure-activity relationship on metal oxide single crystals, metal nano-clusters supported on metal oxides (so called model catalysts), metals, and bimetals (surface alloys). Another focus is on combining nanotechnology and surface science techniques to support nanofabrication. Other areas include carbon nanotubes (as a component of fuel cell catalysts) and TiO2 nanotubes (e.g. photocatalysis).

Mark Hoffmann, Professor and Chair of Chemistry, UND
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Research interests are focused on the development and use of novel methods of electronic structure theory for the elucidation of ground and excited potential energy surfaces (PES) including methods based on hybrid variational-perturbational frameworks, such as quasidegenerate or multireference perturbation theories. Specific interests in algorithms that take into account high performance computer architectures and the application of these methods to a variety of concrete systems such as chemical reactions in which nonadiabatic couplings of surfaces are major effects; metal-containing molecules, catalysts, and combustion reactions.

John Hershberger, Professor and Chair of Chemistry, NDSU
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Chemical kinetics and dynamics of small molecule gas phase reactions. Emphasis on chemistry relevant to combustion and atmospheric processes. Laser photolysis and laser probes are used to investigate these reactions.

Burton Johnson, Associate Professor of Plant Sciences, NDSU
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Research interests are associated with production research for sunflower, alternative, and new crops for North Dakota and the surrounding region. Research topics are related to defining or expanding crop production guidelines related to stand establishment and management of fertility, pests, and harvest practices to achieve optimum production. Areas of expertise include a strong production background for many crops grown in

North Dakota representing oilseeds (edible and industrial), pulses, and cereals. Examples: canola stand establishment, sunflower desiccation, spearmint nitrogen fertility, canola stand density, dry bean simulated hail, oilseed crop adaptation, and definition of cuphea production guidelines.

Evguenii Kozliak, Associate Professor of Chemistry, Und
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Research interests and expertise include applied physical chemistry; microbiology and biotechnology. The application of the fundamental principles of chemical thermodynamics and kinetics to processes with potential practical applications. Experimental determination of gas-liquid equilibrium constants at high temperatures as well as the application of immobilized bacteria in gas phase cleanup processes..

Alena Kubatova, Assistant Professor of Chemistry, UND
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Research interests include the characterization of air particulate matter and the extraction and characterization of valuable species from plant matrices used for biojet production. Specific interest in investigations of the distribution of organic species in different particulate matter size fractions, specifically fine fraction PM based on the development of methods for extraction of organic species based on polarity. Also interested in the extraction and characterization of various chemicals from plant oils generated during the biojet process including the use of novel and tradition extraction methods. Expertise in chromatographic techniques with various types of detectors, mainly mass spectrometric detection (MS). Expertise in extraction methods and instrumentation employing supercritical carbon dioxide, hot pressurized water, and/or organic solvents.

Michael Mann, Professor and Chair of Chemical Engineering, UND
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Principal areas of interest and expertise include performance issues in advanced energy systems firing coal and biomass; renewable and sustainable energy systems with a focus on integration of fuel cells with renewable resources through electrolysis; production of fuel and specialty chemicals from crop oils; and development of energy strategies coupling thermodynamics with political, social, and economic factors.

David Pierce, Associate Professor of Chemistry, UND
dpierce@chem.und.edu ; (701) 777-2942

Interested in research focused on the development of chemical methods that transcend the traditional boundaries of analytical, inorganic and environmental chemistry. Examples include: acoustic-wave sensors, the use of microelectrochemical techniques to study metal-based chemical systems, and electrochemical remediation.

Wayne Seames, Associate Professor of Chemical Engineering, UND
wayneseames@mail.und.edu; (701) 777-2958

Two major research areas: 1) advanced uses and environmental mitigation of the use of coal and 2) the development of processes for fuels and chemicals from crop oils. Interests in evaluating and mitigating the environmental impact of both organic and

inorganic chemicals upon the environment with specific expertise in the analysis and mitigration of trace elements from coal processes. Also, R&D of fuel combustion systems and combustion fuels processing. Expertise in the scale-up of science into commercially relevant processes and in the bench and pilot scale research required for the development of technologies.

Irina Smoliakova, Associate Professor of Chemistry, Und
ismoliakova@chem.und.edu; (701) 777-3942

Research expertise in organic synthesis, stereochemistry and spectroscopic identification of organic compounds. Specific interests in asymmetric transformations of organic and organometallic compounds, C-H bond activation reactions using palladium(II) derivatives and development new catalysts and pre-catalysts based on organopalladium compounds.

Brian Tande, Assistant Professor, Chemical Engineering, UND
briantande@mail.und.edu ; 701-777-3797

Expertise in polymer science and engineering with interests in the application of polymers in sustainable energy. One aspect of this will be the investigation of systems such as block copolymers and nanocomposites for hydrogen storage and fuel cell membranes using tools such as small-angle neutron scattering and electrochemical impedance spectroscopy. Another area of interest is research for producing polymers and composites from renewable resources, such as plant oils and natural fibers.