PURDUE UNIVERSITY

U.S.-CHINA ECOPARTNERSHIP FOR ENVIRONMENTAL SUSTAINABILITY

# Purdue Resource Series

# Agribusiness and Food

农业经营和食品业

- **Advanced plant technology** 高级种植技术
- **Materials for agriculture** 农业材料
- **Feed crop, industrial crop, and economic crop** 饲料作物、工业作物、经济作物
- **Indiana food** 印第安纳州食品

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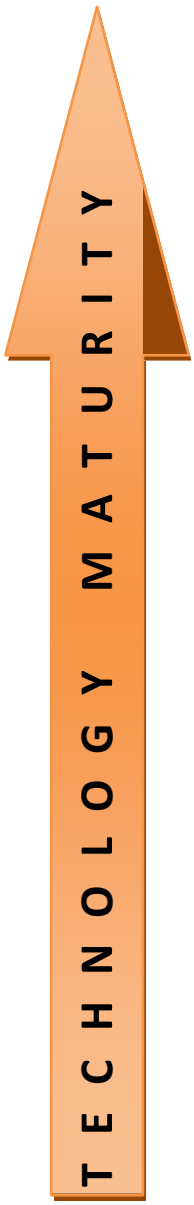
# Contents

## Section 1: Technologies

The following Purdue technologies are available for potential development, licensing or commercialization. Many of the technologies include a Technology Readiness Level (TRL) number which indicates how close each technology is to the market. The following chart describes these categories.

**Definition of Technology Readiness Levels (source: NASA)**




| | | |
|---|---|---|
| **Applied** | **TRL 9** | **Actual system "mission proven" through successful mission operations** Fully integrated with operational hardware/software systems. Actual system has been thoroughly demonstrated and tested in its operational environment. All documentation completed. Successful operational experience. Sustaining engineering support in place. |
| | **TRL 8** | **Actual system completed and "mission qualified" through test and demonstration in an operational environment:** End of system development. Fully integrated with operational hardware and software systems. Most user documentation, training documentation, and maintenance documentation completed. All functionality tested in simulated and operational scenarios. |
| | **TRL 7** | **System prototyping demonstration in an operational environment** System prototyping demonstration in operational environment. System is at or near scale of the operational system, with most functions available for demonstration and test. Well integrated with collateral and ancillary systems. Limited documentation available. |
| | **TRL 6** | **System/subsystem model or prototyping demonstration in a relevant end-to-end environment (ground or space):** Prototyping implementations on full-scale realistic problems. Partially integrated with existing systems. Limited documentation available. Engineering feasibility fully demonstrated in actual system application. |
| **Advanced** | **TRL 5** | **System/subsystem/component validation in relevant environment:** Thorough testing of prototyping in representative environment. Basic technology elements integrated with reasonably realistic supporting elements. Prototyping implementations conform to target environment and interfaces. |
| | **TRL 4** | **Component/subsystem validation in laboratory environment:** Standalone prototyping implementation and test. Integration of technology elements. Experiments with full-scale problems or data sets. |
| **Basic** | **TRL 3** | **Analytical and experimental critical function and/or characteristic proof-of concept:** Proof of concept validation. Active Research and Development (R&D) is initiated with analytical and laboratory studies. |
| | **TRL 2** | **Technology concept and/or application formulated:** Applied research. Theory and scientific principles are focused on specific application area to define the concept. Characteristics of the application are described. Analytical tools are developed for simulation or analysis of the application. |
| | **TRL 1** | **Basic principles observed and reported:** Transition from scientific research to applied research. Essential characteristics and behaviors of systems and architectures. Descriptive tools are mathematical formulations or algorithms. |

## Featured Technologies

### PRF No. 65190 Greatwoods - Genetically Superior Hardwoods

Black walnut trees are highly desirable for use in veneers and as decorative hardwood, but the natural tendency of the walnut tree is to grow crooked and with variable growth rates. Both of these traits reduce the timber value of the tree and cause it to yield fewer pieces of lumber. Researchers have been trying to develop a better walnut tree since the early 1960s but with little success; the long growth time of the tree and a lack of genetic research in the past put making a better walnut tree out of reach until now.

Using various techniques researchers at Purdue University were able to develop several new walnut varieties that reduce variation in growth rate and tree form. These Greatwoods have higher growth rates, better timber quality, and a stronger resistance to disease than any clones currently available.

Black walnuts are not the only improved species being developed. The goal of the Hardwood Tree Improvement and Regeneration Center (HTIRC) at Purdue is to improve the genetic quality and regeneration of fine hardwoods, including black walnut, black cherry, butternut, northern red oak, white oak, and American chestnut through application of classical breeding, genomics, molecular markers, genetic modification, advanced propagation and seed production technologies, and silviculture. Greatwoods are the product of decades of research and testing that have created trees that are more profitable and resilient than ever.

Domain:

- Agriculture

Advantages:

- Higher timber quality
- Higher growth rate
- Better disease resistance

## PRF No. 65530 PCR Assay to Identify dw3 Stable Alleles

Technology Readiness Level: 9

Sorghum plant height is a quantitative trait controlled by four major genes. Nearly all of the grain sorghum grown in the developed world is produced using semi-dwarf cultivars. These cultivars commonly are called "3-dwarf" sorghums since they utilize the recessive dwarfing alleles at three of the major dwarfing genes. Dw3 is the only height gene that has been cloned in sorghum. The recessive dw3 allele used in nearly all commercial cultivars does not produce a functional protein, and, although it can produce a useful dwarf phenotype, the allele is unstable and reverts to dw3 or tall plants. Commercial seed producers do not like height mutants because considerable effort is required to rogue these plants from hybrid seed production fields, which raise costs and seed loss.

Purdue researchers have developed a PCR assay to screen for stable dw3 alleles. Using this assay, four natural variants of dw3 were identified. These new alleles represent a solution to the problem of height mutants in sorghum and have been termed "dw3 stable." Plants with the new alleles cannot be differentiated from plants with the unstable allele by visual inspection. PCR markers have also been developed for the gene to facilitate marker assisted introgression of these alleles into elite parent lines.

Advantages:

- Eliminates height mutants
- PCR markers developed to allow identification of four stable dw3 alleles

## Other Available Technologies

### PRF No. 64984 Detection of Environmental Pathogens

Technology Readiness Level: 4

Researchers at Purdue University have developed a novel portable hybrid device that is capable of sensing an array of infectious agents, utilizing surface plasmon resonance (SPR) and microfluidic technologies. This single device uses both methods to sample and identify rare pathogens in food of the environment. The SPR imaging allows label-free detection of any object within the coded peptide arrays on the device, permitting multiplexed assays and actual capture of pathogenic bacteria. Simultaneous molecular imaging permits multi-color fluorescence assays of pathogen status in a fluorescence image-based cytometry system.

The researchers are currently developing a prototype device based on an inexpensive, portable biosensor that can be taken out into the field to perform analysis at the source locations of contamination.

Advantages:

- Rapid, highly sensitive peptide array utilizing SPR and flow-through image cytometry
- Portable device can analyze on-site for source contamination

## PRF No. 60064 Novel Method for Control of Plant Expression

Technology Readiness Level: 3

Gene promoters are regions of DNA that are responsible for turning genes on by acting as a binding site for RNA polymerase. RNA polymerase is an enzyme that is necessary in protein synthesis. When a gene is expressed, or turned on, the proteins coded by that segment of DNA are produced. Other chemically-induced gene promoters have been isolated; however, the chemicals needed for induction are not suitable for application, because the chemicals are too volatile or toxic to the environment. The Benzoate induced gene promoter offers a chemical approach that is not harmful for the environment, resulting in a specific, safe induction for controlled expression of a gene.

This promoter can be used to regulate expression of any transgene in plants simply by spraying plants with the chemical. Examples of use could be for controlling the timing of gene expression of insect and disease resistance, turning-on the production of a specialty chemical production in plants, controlling flowering in plants, or killing transgenic plants by turning on the production of a gene encoding a herbicide or apoptotic genes. This system would be ideal for any application for which one wants to control the timing of gene expression.

Advantages:

- Chemical inducer is not toxic to the environment
- Control over the timing of gene expression
- Could be sprayed on plants over a large acreage, allowing for control over a mass area

**PRF No. 64463 Biochemical Signaling Mechanisms for Controlling of Wood Staining and Color during Post-Harvest**

When producing wood lumber and veneers such as black walnut, the scarcity and dark, rich colors of the woods result in high market values for the end product. Likewise, woods such as yellow poplar and hard maples have high market values due to the lightness of their color. Unfortunately, the cost to handle and process the woods in order to obtain the desired result is also high. For example, to darken woods such as black walnut, the cut trees must be maintained wet and then steamed or cooked for long periods in order to soften and facilitate the process of "color maturation" for the wood. The wood must then remain wet for 24 to 48 hours for the wood to completely darken or lighten.

This technology is a chemical based method to control the post-harvest physiology of wood and lumber. Damage induced biochemical signals that lead to undesirable wood coloration changes can be induced or inhibited during processing that takes place after field harvesting. The technology can prevent the discoloration of white wood lumber, such as yellow poplar and hard maples, or can induce dark coloration in woods, such as black walnut.

Domain:

- Chemical Analysis

Advantages:

- Post-harvest process can be readily included in saw mill, lumber sorting, or veneer slicing operations
- In-line process provides shorter processing times with lower inventory levels while eliminating steam chamber equipment and off-line batch processing
- Low setup costs requiring relatively simple machinery
- Simple control systems lead to low operating costs

**PRF No. 60073 Cloning and Characterization of REF 8 Gene (C3H) of Arabidopsis**

Phenylpropanoid compounds have a wide variety of functions in plants. These compounds contribute to plant growth and development, and are important components of the secondary cell wall. Recent studies have found that phenylpropanoid compounds are also beneficial toward human health, creating an estrogen-like activity.

Purdue inventors have cloned the gene REF8, allowing for better understanding of how phenypropanoid metabolism is regulated as well as affected by environment. Possible applications include improving forage digestibility, decreasing the dihydroxyphenols in plants that cause browning reactions, and screening for inhibitors of C3H that would have value as herbicides. Also, the technology can decrease lignin biosynthesis for the production of bio-fuels.

Domain:

- Agrobioscience

Advantages:

- Decreasing and possibly increasing lignin in plants
- Improving forage digestibility
- Modification of other aspects of secondary metabolism in plants

## PRF No. 65095 Dried Distillers Grain Alternate Uses

As ethanol production continues to ramp up, the volume of remnant by-product of dried distillers grain solids (DDGS) is becoming a bigger issue. Current uses include animal feed; however, only certain domestic animals can digest it as a meaningful feed.

Researchers at Purdue University have discovered another use for this widely available resource: a natural carrier for chemicals. It is known that grain will absorb moisture, so researchers developed a process for reducing the DDGS to a uniform micro-sized particle coated with water based chemicals. These tiny particles can be spread uniformly across an intended area, and they even have the possibility of time-release delivery.

Domain: Agrobioscience

Advantages:

- Useful application for DDGS which is abundant but has limited applications
- Potential use for time-release delivery

## Section 2: Companies in Purdue's Research Park that may be interested in international collaboration

**For more information on Research Park and its companies, see http://purdueresearchpark.com/**

**Advanced Ag Solutions, LLC**
http://www.advancedagsolutions.com/

**Conservation Technology Information Center (CTIC)**
http://www.conservationinformation.org

**Green Tech America, Inc.**
http://www.greentechamerica.com

**National Swine Registry**
http://www.nationalswine.com

**Nature's Farm**
http://www.naturesdairy.com

## Section 3: Purdue contract research facilities and services potentially available to external organizations

**Agronomy Center of Research and Education**

The Agronomy Center for Research and Education (ACRE), established initially as the Agronomy Farm in 1949, is a campus-based field research station for agronomic crops and soils research for the Agronomy Department and other departments working on field crops. At ACRE 53 scientists from 8 departments and USDA researchers conduct 180 studies ranging from basic to applied research. The research taking place includes plant breeding and genetics, crop production and soil tillage management, plant physiology, soil fertility, weed control, disease and insect resistance and control, and variety performance evaluation for corn, soybeans, small grains, sorghum and alfalfa.
http://www.ag.purdue.edu/agry/acre/Pages/default.aspx

**Life Sciences Electron Microscopy Facility**

The LSMF is a full service electron microscopy core providing equipment, training (Scanning Electron Microscope and Transmission Electron Microscopes courses), space, advice, and expertise so that researchers can come to the laboratories to conduct their research efficiently. The facility contains research equipment for use by students, faculty, postdoctorals, and service staff. Technology in the LSMF provides capabilities for light microscopy, transmission electron microscopy, scanning electron microscopy, and computer-based image analysis. Equipment is available for cryo sample preparation (high pressure freezing and freeze substitution, ultramicrotomy, critical point drying, vacuum evaporation, sputter coating, digital printing, and histological and cytological specimen preparation. Staff in the LSMF provides expertise in a wide range of specialized preparation techniques including immunocytochemistry and freeze substitution to assist researchers.
http://www.ag.purdue.edu/facilities/microscopy/pages/default.aspx

**Genomics Core Facility**

The Purdue Genomics Core facility has more than a decade of experience in DNA sequencing. This facility offers data generation and wet laboratory services such as high and low-throughput sequencing services as well as first-pass informatics support. Specific services provided include "sanger" sequencing, next-generation sequencing, determination of the DNA sequence of plasmid or PCR product DNA using a standard vector primer or your custom primer, and web-based delivery of the sequence, its chromatogram and BLAST searches. Additionally, they provide statistical consulting services. http://www.genomics.purdue.edu/

**Center for Global Trade Analysis**

The Global Trade Analysis Project (GTAP) is a global network of researchers and policy makers conducting quantitative analysis of international policy issues. GTAP's goal is to improve the quality of quantitative analysis of global economic issues within an economy-wide framework. GTAP offers a variety of products, including: data, models, and resources for multi-region, applied general equilibrium analysis of global economic issues. It also organizes courses and conferences and undertakes research projects. The Center for Global Trade Analysis employs staff members and graduate assistants, as well as coordinating with CGE modelers and trade economists, to support and further GTAP's missing. https://www.gtap.agecon.purdue.edu/

**Animal Sciences Research and Education Center**

The mission of the Animal Sciences Research and Education Center (ASREC) is to provide animals, facilities, technical assistance and labor to conduct research, provide instruction, and assist in extension educational activities. Research trials vary from basic to applied and involve many disciplines -- nutrition, physiology, behavior, genetics, reproduction, animal health, and product quality. Faculty utilize the Research and Education Center to facilitate teaching several Animal Sciences courses and to help provide hands-on experience for students. Additionally, the center houses extension education activities including the following: a Lambing School, an Animal Sciences Workshop for Youth, 4-H and FFA judging, Purdue Royal, and Tots' Day.
http://www.ag.purdue.edu/ansc/Pages/ASREC.aspx

## Center for Environmental and Regulatory Information Systems

The Center for Environmental and Regulatory Information Systems (CERIS) is a recognized center at Purdue University providing agricultural information resource technologies and applications in the form of searchable databases with web interfaces, collaborative web sites with updating, and dynamic map resources of pest survey and plant diagnostic data. Since the 1980's, its content has focused on plant export regulations, pest survey data, plant diagnostic data, and pesticides and has collaborated with key federal and state agencies along with industry. A new project under development with Entomology and Plant Pathology is the creation of an iPhone application for ornamental diagnostics. http://ceris.purdue.edu/ceris/

## Purdue Agriculture Air Quality Lab

PAAQL specializes in odor assessment using olfactometry, chemical analyses using gas chromatography, and continuous emissions monitoring of ammonia, hydrogen sulfide, carbon dioxide and particulate matter. Our core laboratory capabilities include: (1) Olfactometry in full compliance with both the ASTM and CEN standards regarding olfactometry technique, (2) Gas chromatography using their recently purchased Agilent 6890 Gas Chromatograph and 5875 Mass Spectrometer. Incorporation of a GERSTEL odor port also allows for the identification of individual compounds which are responsible for offensive odors, (3) Access to the Swine Environmental Research Building (SERB), a wean-to-finish swine facility which combines clean laboratory space with independent systems for ventilation, feeding, watering, and waste collection for up to 720 pigs, and (4) Environmentally controlled laboratory space, in which quality research can be performed under specific controlled settings.
https://engineering.purdue.edu/~odor/facilities.htm

**Life Sciences Fluorescence Imaging Facility**

The Life Sciences Flourescence Imaging Facility is a user-driven facility that provides basic training on state of the art equipment allowing users to perform their own experiments. Following training, the facility offers access to the following: (1) the Zeiss LSM 710 confocal spectral scanning laser microscopy (upright) with workstation for data processing, (2) the Zeiss Axio Observer epifluorescence microscope (inverted), and (3) the Intavis Insitu ProVS preparative robot, which can do dehydration series, hybridization incubations for in situ immunolocalizations, and rehydration series.
http://www.agriculture.purdue.edu/clsm/index.shtml

**Purdue Translational Pharmacology Facility**

The Purdue Translational Pharmacology Facility, with synergizes with the Metabolite Profiling Facility in the Bindley Bioscience Center, facilitates the pharmacological analysis of blood samples collected from test subjects. This facility utilizes the first Culex-L Large animal automated in vivo sampling system at Purdue University to provide unique PigTurn monitoring and modeling.
http://www.purdue.edu/discoverypark/bioscience/facilities/ptp/index.php

**Purdue Tourism and Hospitality Research Center**

The Purdue Tourism & Hospitality Research Center has been established to provide world-class tourism research for destinations and their communities, the tourism and hospitality industry. The center serves communities, tourism organizations and businesses with practical, up to date expertise and skills. Our research and planning projects for industry assist destinations to maximize the potential of tourism and organizations to improve their performance. The center also delivers professional development for tourism professionals and supports advancing the discipline of tourism and hospitality through research. The center provides hands-on research opportunities for tourism and hospitality students to develop their life-long learning skills and real world experience for students preparing to join the industry.
http://www.cfs.purdue.edu/htm/research/tourism/tourism.html

## Center for the Study of Lodging Operations

The mission of the Center for the Study of Lodging Operations (CFSLO) is to serve the hotel industry and related organizations by providing up-to-date and timely information as well as quality research related to lodging operations of all types. This includes hotels, timeshares, resorts, casino hotels, bed and breakfast operations, and assisted living facilities. The CFSLO seeks to advance the hotel industry at the local, national, and international level through the use of basic and applied research to deal with industry issues and challenges. They aim to be the leading source of high quality and value-added research to the lodging industry.
http://www.cfs.purdue.edu/htm/research/lodging/lodging.html

## Hub Platform (virtual organizations)

HUBzero™ is an open source software platform for building powerful web sites that support scientific discovery, learning and collaboration. Originally created by researchers at Purdue University in conjunction with the NSF-sponsored Network for Computational Nanotechnology to support nanoHUB.org, the HUBzero platform now supports dozens of hubs across a variety of disciplines, including cancer research, pharmaceuticals, biofuels, microelectromechanical systems, climate modeling, water quality, volcanology, and more. Under the hood, powerful middleware serves up interactive simulation and modeling tools via your web browser. These tools connect you with rendering farms and powerful Grid computing resources.
http://hubzero.org/

## Envision Center

The mission of Envision Center for Data Perceptualization is to serve, support, and collaborate with faculty, students, and industry to be a leader in scientific visualization through learning, discovery and engagement. Researchers in the Envision Center explore novel computer graphics, advanced visualization, and human computer interface technologies, such as auditory, haptic, and multimodal interaction. These technologies are integrated with state-of-the-art advanced computation and networking, and high-end immersive visualization environments to assist researchers and industry in their quest for new knowledge and innovative products. The Envision Center serves as a window into computational aspects of science and engineering, providing effective means to communicate complex research results to students, researchers, and the general public. http://www.envision.purdue.edu/

## Software Solutions

The Rosen Center for Advanced Computing provides access to leading-edge computational and data storage systems, as well as expertise in a broad range of high-performance computing activities. The RCAC evaluates, deploys and supports hardware and software for large-scale scientific computing. They also promote the effective use of our computing systems and application software through training and education, consultation, and documentation, contribute to the discovery process through algorithm design and the development of effective computing techniques, and partner with researchers to develop grant proposals by providing expertise in the assessment of hardware and software requirements. A partner in their collaborative efforts, the Scientific Solutions group works with Purdue faculty and staff to develop proposals and specific research solutions including computation- and data-intensive applications, science portals and other web services.
http://www.rcac.purdue.edu/projects/

## Research Machining Services

Research Machining Services through Purdue's Discovery Park offers services and supplies in machining and welding, design and drafting, R&D prototyping to small production runs, and materials and hardware. A precision machine shop, open to all departments, provides both standard and CNC machining equipment, welding, and design services. Research Machining Services maintains a diverse inventory of the most common alloys of steel, stainless steel, aluminum, and brass in standard material sizes and structural shapes, plus offer special-ordering of exotic alloys and high-performance plastics. The Research Machining Services provides plating, anodizing, and water jetting services, along with many other services through vendors. They also specialize in one-of-a-kind research equipment and/or modifications.
http://www.purdue.edu/discoverypark/machineshop/

**Machine Shop PHYS 39**

The Physics Instrument Shop at Purdue University uses leading-edge computer-aided design and manufacturing software integrally linked to CNC machines, to produce precision parts and assemblies from a wide variety of materials. It specializes in small parts fabricated to precise tolerances. The machine shop extensively uses the (Autodesk) Inventor software to design parts and to make final assembly drawings. It offers a wide variety of equipment, including multiple mills and lathes, and raw materials, as well as an extensive stock of steel and stainless cap screws.
http://www.physics.purdue.edu/machineshop/

**Biological Sciences Electron Microscopy Facility**

The Biological Electron Microscopy Facility (BEMF) is intended to create the infrastructure for high-throughput structure determination of biological macromolecules and their assemblies by electron cryo-microscopy (cryo-EM) and three-dimensional (3D) image reconstruction. The scientific program of the Facility includes a variety of studies using cryo-EM for 3D structure determination of viruses, bacteriophage or other larger macromolecular complexes, as well as employing cryo-electron tomography to examine virus/cell interactions. Researchers using the Facility have published structures of human pathogens that cause diseases such as Polio, Dengue Hemorrhagic Fever and West Nile Fever.
http://www.bio.purdue.edu/molecular_biosciences/microscope_facility.html

**X-ray Crystallography**

The x-ray crystallography laboratory provides data collection, structure analysis, and crystallography consultation services. Equipment available at the lab include (1) a Rigaku Rapid II image plate diffractometer equipped with a MicroMax002+ high intensity copper x-ray source, (2) a Nonius KappaCCD diffractometer on a sealed tube molybdenum source, (3) Oxford Cryosystems low temperature device capable of temperatures from 400 to 90K, and (4) LINUX PCs for structural calculations and the Cambridge Structural Database. (Other computers are available for collection and processing diffraction data.) http://www.chem.purdue.edu/xray/default.asp

## Amy Analytical Instrumentation Center

The Amy Analytical Instrumentation Center is a core facility in the Department of Chemistry that supports instruments and information technology and manages the shared departmental instrumentation. The center handles instrument design, fabrication, repairs and consulting as well as IT-related installation, networking and support. The long-established philosophy of the facility is to understand the experimental problem in depth such that the appropriate measurement of technology can be applied. The Amy Analytical Instrumentation Center houses a large range of instruments that can be accessed by both departmental and non-departmental users.
http://www.chem.purdue.edu/aaic/

## Purdue Stable Isotope Facility

The Purdue Stable Isotope (PSI) facility is a state-of-the-art multi-user, stable isotope laboratory housed in the Earth and Atmospheric Sciences Department at Purdue University. The PSI group conducts research in a range of environmental and climate-related areas, including biogeochemistry, hydrology, ecology, and paleoclimatology. Analytical services currently offered include: (1) H and O isotope analysis of waters at natural abundance or high enrichment by TCEA-IRMS (precision < 1‰, 0.2‰), (2) H and O isotope analysis of organic solids by TCEA-IRMS (precision < 2‰, 0.3‰), (3) C and O isotope analysis of carbonates by GasBench-IRMS (precision < 0.1‰, 0.1‰), and (4) a range of chemical and physical sample preparation services. The facility houses three gas Isotope Ratio Mass Spectrometers (IRMS), each accompanied by peripheral devices for conversion of various compounds into analyzable gases.
http://www.eas.purdue.edu/psi/

## PRIME Lab

The Purdue Rare Isotope Measurement Laboratory (PRIME Lab) is a dedicated research and service facility for accelerator mass spectrometry (AMS). AMS is an ultra-sensitive analytical technique for measuring low levels of long-lived radionuclides and rare trace elements. The accelerator is used to measure both man-made and cosmic-ray-produced radionuclides such as $^{10}$Be (half-life 1,600,000 years), $^{14}$C (5730 years), and $^{36}$Cl (300,000 years) in natural samples having isotopic abundances down to one part in $1x10^{15}$. http://www.physics.purdue.edu/primelab/

## Interdepartmental NMR Facility

The Purdue Interdepartmental NMR Facility (PINMRF) is a university-wide resource dedicated to supporting NMR spectroscopy and to making this analytical technique available to researchers at Purdue and elsewhere in the scientific community. PINMRF currently has ten NMR spectrometers located in six laboratories in four buildings on the Purdue campus, with additional laboratory locations under consideration. PINMRF is set up to allow individual researchers direct access 24/7 to the spectrometers, after appropriate training and testing has been completed. However, we will gladly provide spectra of submitted samples, either on a service basis or as part of a collaborative research project. http://www.pinmrf.purdue.edu/

## Campus-wide Mass Spectrometry Center

The Campus-wide Mass Spectrometry Center (CWMSC) is a Purdue facility created to coordinate the operation and maintenance of and to provide research groups asses to mass spectrometers across campus. The facility insures a high level of quality control for the more routine types of analyses, and provides a collaborative analytical mass spectrometry capability to the Purdue research community. All major mass spectrometric ionization techniques and sample introduction methods are available, including gas chromatography, liquid chromatography, electron impact, chemical ionization, electrospray ionization, inductively coupled argon plasma, matrix-assisted laser desorption ionization, atmospheric pressure chemical ionization and high resolution mass measurements.
http://www.chem.purdue.edu/cwmsc

**Medical Discovery Resource Unit (MDRU)**

The MDRU is a cluster of core laboratories in the School of Veterinary Medicine to support biomedical research. The laboratories are the Purdue Histology and Phenotyping Laboratory, the Clinical Trials Group, and the Clinical Discovery Laboratory. The mission of the MDRU is to support campus-wide interdisciplinary research by providing the professional expertise and facilities needed to support preclinical and translational biomedical investigation. It provides collaborative support for investigators in various academic departments on campus, in Discovery Park, and in the local private-sector as well as opportunities for hands-on learning and training of graduate, undergraduate and professional students with an interest in comparative biomedical research. The MDRU component laboratories are all core facilities for the Indiana Clinical and Translational Science Institute (CTSI).
http://www.vet.purdue.edu/mdru/

**Superresolution Imaging Lab**

This facility in the Purdue Veterinary Medicine provides a high end confocal imaging system for versatile cell, whole mounted- tissue and animal microscope imaging. It's equipment capabilities are: (1) regular 5-color and DIC fluorescence confocal imaging; (2) 5 NDD (4RLD and 1 TLD) multi-photon confocal imaging; (3) forward and backward second harmonic generation imaging; (4) 70 nM STED superresolution imaging; (5) Regular and resonant scanning; (6) FRAP / FLIP / Photoactivation / FRET (ratio or accept or photobleaching) / Multi-time, ion concentration, ratiometric imaging; (7) Live cell imaging and tracking in Ludin Chamber with controlled CO2 gas, light and temperature (8) Deep tissue imaging in live animals in an inverted position; (9) Anesthesia machine for animal imaging (isoflurane gas).
http://www.vet.purdue.edu/imaginglab/index.php