**Minutes of NC-1023, USDA Multistate Project Meeting**

**October 20-22, 2024**

**University of Hawaii**

**Honolulu, HI**

### **Chair**: Juliana Leite Nobrega de Moura Bell,[jdemourabell@ucdavis.edu](mailto:jdemourabell@ucdavis.edu)

### **Chair-Elect**: Dharmendra Mishra, [mishradh@purdue.edu](mailto:mishradh@purdue.edu)

**Past chair:** Nitin Nitin, nnitin@ucdavis.edu

**Secretary:** Deepti Salvi, dasalvi@ncsu.edu

**Admin Advisor:** David Jackson, [djackson@nebraska.edu](mailto:djackson@nebraska.edu)

**Host:** Soojin Jun, soojin@hawaii.edu

**Attendees (29):**

1. Adedeji, Akinbode (University of Kentucky)
2. Bornhorst, Gail (University of California, Davis)
3. Ciftci, Ozan (University of Nebraska-Lincoln)
4. Clementson, Clairmont (North Dakota State University)
5. Datta, Ashim (Cornell University)
6. Dolan, Kirk (Michigan State University)
7. Gunasekaran, Sundaram (University of Wisconsin-Madison)
8. Jackson, David (University of Nebraska-Lincoln)
9. Kaletunc, Gonul (The Ohio State University)
10. Kamruzzaman, Mohammed (University of Illinois, Urbana-Champaign)
11. Karwe, Mukund (Rutgers University)
12. Krishnaswamy, Kiruba (University of Missouri)
13. Lamsal, Buddhi (University of Iowa)
14. Leite Nobrega de Moura Bll, Juliana (University of California, Davis)
15. Maleky, Farnaz (The Ohio State University)
16. Jun, Soojin (University of Hawaii)
17. Mishra, Dharmendra (Purdue University)
18. Muthukumarappan, Kasiviswanathan (South Dakota State University)
19. Nitin, Nitin (University of California, Davis)
20. Ruan, Roger (University of Minnesota)
21. Salvi, Deepti (North Carolina State University)
22. Silva, Paulo (University of Iowa)
23. Singh, Rakesh (Georgio State University)
24. Takhar, Pawan (University of Illinois, Urbana-Champaign)
25. Tikekar, Rohan (University of Maryland)
26. Ubeyitogullari, Ali (University of Arkansas)
27. Wei, Lin (South Dakota State University)
28. White, Shecoya (Mississippi State University)
29. Zhao, Yanyun (Oregon State University)

**A brief summary of minutes of the annual meeting**: The 50th-anniversary annual meeting was held at the University of Hawaii, Honolulu, HI, from Oct 22-24th, 2024. The opening dinner was held at Assaggio Kahala on October 22nd, and the meeting sessions started on Oct 23rd at the University of Hawaii, Honolulu, HI. Prof. Bell welcomed all stationed members in her opening remarks. Dean Walter Bowen welcomed the group. Dr. Chen joined online and provided Washinton updates. He Congratulated the group for the 50th anniversary. He acknowledged 2021 NIFA partnership award and stated that many leaders in the field emerged from this group. He talked about the NIFA Foundational Program and provided suggestions for the next rewrite 2025-2030. NC 1023 Administrator Prof. David Jackson’s talk mainly focused on re-write for NC1023 project for 2025-2030. Prof. Zhao presented the report representing the current Steering Committee (Prof. Yanyun Zhao, Prof. Gail Bornhorst, Prof. Rohan Tikekar, Prof. Muthu, and Prof. Kirk Dolan). The previous Meeting’s Minutes were approved. Prof. Bornhorst gave a presentation about the 50th Anniversary of the NC-1023 multistate project. The first meeting was in 1974 (5 members), and the project was limited to the north-central region. Prof. Bornhorst also presented guidelines for the 2025-2030 re-write and discussed the goals for the meeting. After this the groups worked on each objective of the 2025-2030 project. Objectives already submitted to NIMSS were listed, and all groups were requested to work together. Prof. Karwe and Prof. Krishnaswamy led the discussion on Objective 1. Objectives 2 and 3 was led by Prof. Datta and by Prof. Tikekar. After lunch and Lyon Arboretum, the group continued working on the rewrite objectives. An update on the NC-1023 Multi-institutional Food Engineering Course/Seminar series was provided by Dr. Tikekar. The business meeting was conducted to elect a new secretary and steering committee. Prof. Krishnaswamy was elected secretary, and Prof. Tikekar, Prof. Cifti, Prof. Takhar were elected as new steering committee members. Prof. Dolan, and Prof. Bornhorst continued steering as committee members. Dinner was held at Plumeria Beach House, Honolulu, HI.

Second day of the meeting (Oct. 22) started with station reports. Short updates from stations based on the alphabetical order of the station name.Prof. Dan Farkas was remembered. The group discussed the Conference of Food Engineering 2026 in Hawaii. Prof. Kaletunc discussed possible locations and times (with the possibility of changing from August). Prof. Karwe talked about revisiting the classification of food for Ultra-processed food. A possible white paper can be written by the group. Prof. Karwe and Prof. Nitin will take the lead. The meeting ended on noon on October 22th, 2024. Detailed minutes are available upon request.

**Sunday, October 20**

1. **6:00 - 8:00 pm Welcome Dinner (Meeting place:** **[Assaggio Kahala](https://www.assaggiobistro.com/), 4346 Waialae Ave., Honolulu, HI 96816)** [**https://g.co/kgs/SFRxE6E**](https://g.co/kgs/SFRxE6E)

Welcome dinner was attended by all members. Discussions on the project and the planned activities with station representatives and ad-hoc committee members.

**Monday, October 21**

**8:30 – 9:15 am**

1. **Opening comments**

Prof. Juliala Bell welcomed all stationed members in her opening remarks. She introduced the meeting goals.

1. **Welcome presentation by Associate Dean Walter Bowen (CTAHR)**

Dean Walter Bowen welcomed the group. He talked about trying Ag Innovation for the individual research program.

1. **Station Member Introductions**

All station Members introduced themselves.

1. **Washington Update (Dr. Hongda Chen, USDA/NIFA)**

Dr. Chen joined online and provided Washinton updates. Congratulated the group for the 50th anniversary and appreciated the dedication to leaders in food engineering.

He acknowledged that many leaders in the field emerged from this group. The NC1023 group received the 2021 NIFA partnership award for the seminar series.

He talked about NIFA Inspired Science Transforming Lives. The FY2024 budget was $1.956 B and they are waiting to hear about new budget.

He talked about Novel food and Innovative manufacturing technologies, A 1364 program. A total of 40% of NIFA proposals were for the A1364 program in 2024. In 2025, that number increased to 50%. He talked about the following points:

* Active field reflects a tremendous need for research
* FY 23: 24 Proposal funded, $11.3 M, 21% average success rate
* A few projects funded in the program by the NC1023 group collaboration were mentioned
* From 100 proposals (2019) to 150 Proposals (2023) since the program started
* A total awards of 109, with a total funding of $50.6M
* 16-17 proposals will be funded in FY 2024
* PD meeting 2024 was held in UMASS
  + Plant-based ingredients
  + Meat and animal-based
  + Functional and food Ingredients
  + Food engineering
  + Processing and packaging
  + Seed grants
* He also mentioned other AFRI programs such as Nanotechnology for Agricultural and Food Systems and Food and Human Health. Food safety and Defense, Data Science and Agricultural Systems,
* Next, RFA will be available during the Holiday season of 2024. Since it gets revised, read it carefully as the description is revised

He also provided suggestions for the future food engineering discipline (for the next rewrite 2025-2030). Following are some of the points suggested by Prof. Chen.

* Use a multidisciplinary approach, a big system approach
* Foster collaboration
* Consider advanced science and societal aspects
* Multidimensionality of food Characteristics
* Collaboration between food and nutrition scientists
  + - Classification of food, ultra-processing
    - Quantification and formulation of Processing effect
* It should include
  + - Physical, chemical, and biological action of food
    - Novel forces beyond ‘Fire and Ice’
    - Fate and transport of food components and structure within the GI tract
    - Extension into food production (e.g. Cell culture)
    - Forste and lead cross-disciplinary approach

1. **NC 1023 Administrator Update**

Prof. David Jackson welcomed everyone. His talk mainly focused on re-write for NC1023 project for 2025-2030. He reminded that we need to finish one more year left on the current project. The next year will be the final year and a summary of all 5 years of activity is expected to be reported. Here are some of the points discussed in the presentation.

Rewrite

* **Final Project due Dec 1 (final deadline; if you miss, you need to wait 1 year, NO EXTENSION)**
* Notification of approval in early April
* You can’t change what you propose for the next 5 years
* Make sure some goals remain realistic, and some remain optimistic
* Are there any potential new members (consider that in re-write)
  + Be specific for current members but provide flexibility
* Proposed new objective (we can still revise)
* The first objective needs wordsmithing
* **Objectives (already entered into NIMSS)**

1. Develop and characterize innovative food materials, sustainable processing, and packaging technologies to ensure safety and enhance the shelf-life, quality, functional, and nutritional properties of foods.

2. Develop mechanistic and data-driven mathematical models to enhance understanding and optimization of food manufacturing.

3. Utilize pedagogical strategies to integrate cutting-edge food engineering research into teaching and outreach programs to enhance student learning, technology implementation, and stakeholder engagement.

* Treat this like you do a grant proposal
  + What you already know and what you can do now (before the proposal is in) to lay the foundation and ensure success
  + Is the plan flexible if the situation changes
  + Milestones should be realistic
  + Make sure you can accomplish what you propose
* Key Questions to Ponder
  + What more needs to be done in terms of science (research) and stakeholders (Education/Industry/Government)
  + What can be done better as a group (not individual efforts)
  + With broad objectives, you need specific efforts
  + Have integration between the objectives
  + Address priorities of federal funding agencies (Don’t just focus on the USDA agency; consider NSF and other agencies)
  + What problems to be solved
    - Is there an urgent need in the particular area
    - Is there a new and emerging need or concern
    - What are stakeholders input? (same or different than above)
    - Proposed parts of the proposal
      * Related, current, and previous work (brief review) including from the CRIS system
      * Objectives
      * Methods
      * Measurement of Progress and Results
        + Outputs (Results and Research)
        + Outcomes or Projected Impacts (Benefits)
        + Milestones (What occurs when)
      * Outreach Plan
      * Organization/Governance
      * Literature Cited

1. **Steering Committee Report**

The current Steering Committee includes Prof. Yanyun Zhao, Prof. Gail Bornhorst, Prof. Rohan Tikekar, Prof. Muthu, and Prof. Kirk Dolan. Prof. Zhao presented the report. The committee has been working with the current executive committee over last year.

For the next steering committee, the current eligible members

* Must be past chair
* Must be part for the last 5 year
* Must be present in the meeting

A new steering committee will be decided in this meeting

1. **Approval of Previous Meeting’s Minutes**

Prof. Muthu suggested that the meeting minutes needed some corrections. Prof. Mishra (past secretary) corrected those mistakes, and the minutes were approved.

**9:15 - 9:45 am    Review of the NC-1023 project’s outline, rewrite requirements, and deadlines (completed and pending tasks)**

Prof. Bornhorst presented guidelines for 2025-2030 meeting re-write. She provided the following deadlines.

October 15: Upload Objectives, Issues, and justification sections in NIMMS

*Prof. Bornhorst suggested that the deadline has been met*

* Early November: Complete Compete Appendix E forms with your ag experimentation stations.

*Prof. Bornhorst suggested that all existing members will receive the email. Please ensure to complete this form. Also, share with any potential new members.*

* November 8: Target date for the draft for all sections for review
* November 18: Send feedback to the executive + steering committee
* November 25: Completed proposal uploaded in NIMMS
* December 1: Submission deadline
* April: Required revisions in the project will be sent to our administrator and to the group.
* June 1: All requested proposal revisions must be uploaded to NIMMS
* July: Proposal revisions are reviewed, and a decision is made on the project.
* September 30, 2025: Current project expires
* October 1, 2025: New project begins (if approved)

She suggested that we break into groups and work on re-writing during the meeting.

The goals for this meeting were

* The group for each objective will finalize the text for
  + Research Methods (3/4-1 page)
  + One Output
  + One outcome
  + One impact
* Form groups for other sections (senior + junior members)
  + Related, current& previous work (survey will be sent today)

Goals for after the meeting

* Send information on publication/grants in survey form (Oct 28)
* Fill out appendix E form (NC 1023\_temp) with your AES (Nov 15)
* Finalize information on each objective and send to the executive committee + steering committee (Nov 8)
* Finalize Proposal will go out for comments to all members (Nov 11)
* All Comments back to ex-committee (Nov 18)
* Pans to submit to NIMMS (Nov 25)
* Submission deadline- Dec 1

Objectives already submitted to NIMSS were listed, and all groups were requested to work together. The following were leads for each objectives:

Objective 1 was led by Prof. Karwe and Prof. Krishnaswamy.

Objective 2 was led by Prof. Datta.

Objective 3 was led by Prof. Tikekar.

**9:45 – 10:00 am *Break***

A bio break was provided. Refershments were served.

**10:00- 11:00 am         Brainstorm session: groups work on each objective (2025-2030 project)**

Prof. Tikekar presented feedback from members on the questionnaire (google form sent by him, Prof. Wang, and Prof. Dolan) for Objective 3 (teaching and extension)

* Enhance and expand the food engineering webinar series
* Extension- repository or webpage as a resource hub, co-teach courses
* Short course or webinar series on topics of industry interest (team teach)

Prof. Datta presented feedback from members on the questionnaire for Objective 2 (Modeling: mechanistic and data-driven, Prof. Ren Yang and Prof. Jiyoon also worked on this objective)

* Mechanistic model
* Data-Driven model
* Integrating mechanistic and data-driven modeling (hybrid) for practical applications

Objective 1 leaders (Prof. Karwe and Prof. Krishnaswamy ) did not present as they were assigned on-site to work on this objective. None of the assigned leaders (from the last meeting) were present in this meeting.

Prof. Bornhorst advised the group to break into group discussions to finalize the text.

**11:10 – 11:45 pm       Group discussion to finalize the scope of each objective (5-min   presentation for each group followed by discussion and feedback)**

Members discussed new objectives and possible collaboration in the Group.

Prof. Bornhorst reminded everyone to put together an actual collaboration that can be added to objectives. Each group should come up with methods that will have output and impact.

**11:45-12:00 pm          An update on the Food Physics, Modeling, and Food Properties database (Prof. Data)**

**Novel resources for food physics**

Prof. Datta talked about novel resources for food physics. He has 2 project that all station can collaborate with him. He discussed on how to include the advancements in the field in instructions to train future generations. His group has developed modules that can be added to courses that include application, theory, and modeling-based modules in food engineering, food processing, and food safety courses.

He also has resources for the development of modeling courses for undergraduate courses.

He iterated that these are not just videos but have active learning materials.

These modules have been tried in other universities (CA, TN), and students' feedback is very positive.

He is looking for collaborators who can incorporate this in their syllabus.

**Food properties database**

He also talked about the food properties database. His team has included many formulas for various materials that can provide data on various properties.This database saves time in searching for research papers.

The mode of collaboration will be instant accessibility of data and validate models as you generate those. In educational content, the students can develop an understanding of the same food properties for different materials or different food properties for the same materials. ‘What if’ based scenarios can be studied. The data can be used in the following course

* Food Engineering
* Food Processing
* Food Properties

This database is currently being used in the University of Washington and Cornell.

He is seeking collaborations

* Use of (and contribute to) food properties database
* Developing a repository for digital resources for the community
* Use module or the entire course
* Use module in food safety
* Use active learning resources like worksheets

**11.55 am - 12.00 pm The 50 the Anniversary Talk**

Prof. Bornhorst gave a presentation about the 50th Anniversary of the NC-1023 multistate project. The first meeting was in 1974 (5 members), and the project was limited to the north-central region. In the 2000s there were 23 states and in 2025 the project expanded to include 30 states. Most of the historic information was provided by Denny Heldman and other long term NC1023 members who have already retired.

Prof. Jun suggested that he has organized a 50th Anniversary cake that will be cut during lunch.

**12:00 - 1:00 pm *Lunch - Provided at the meeting location***

Lunch was provided on-site.

**1:00  - 2:30 pm** [**Lyon Arboretum**](https://manoa.hawaii.edu/lyon/gardens-and-features/gardens/) **tour**

The members visited Lyon Arboretum after lunch.

**2:40 – 4:30 pm Write up of the objectives**

The group continued working on the rewrite objectives.

Objective 1: Prof. Krishnaswamy and Prof. Karwe summarised the details of the discussion for objective 1. They talked in detail about the first subgroups on the extraction of fibers from pomace. Prof. Jackson asked questions regarding which stations are participating and specific details of the project. Prof. Zhao, the leader of the subgroup, explained. Prof. Fortes-Da-Silva will lead the second subgroup on plasma standardization. Prof. Guna will lead the third group on sensor technology. Prof. Krishnaswamy will lead the fourth group, which will discuss food's functional and nutritional properties. All subgroups have identified problem statements, methods, and timelines. Prof. Zhao will lead the fifth group on smart and sustainable packaging.

Prof. Jackson and other members discussed whether these projects are specific or flexible.

Objective 2: Prof. Datta talked about objective 2 with 3 sub-areas. Mechanistic modeling: The first sub-area included fat binding.

Data-driven models: NC and CA Station

Discussions from members were included to tie in between the bigger objectives.

Prof. Jackson suggested that four subprojects are a bit ambitious. Make sure how this specific project can involve other members once initial models have been established.   
More discussion will be continued. Prof. Datta requested a response to the survey that was sent.

Objective 3: Prof. Tikekar explained that there will be 4-5 subtasks will be under this objective. The first task will include the expansion of the seminar series to include industry and publishing a manuscript. The second task is to create a resource hub for extension. The third task will be a repository of educational resources. The fourth task will be to develop courses and webinars on emerging topics. The fifth task will include Developing a Scholarship in Teaching and Learning webinar series for NC 1023 members. Output may include websites, articles, learning modules, magazine articles, etc.

**4:30 – 4:45 pm            Update on the NC-1023 Multi-institutional Food Engineering Course/Seminar series & Discussion**

This was not discussed as the objective 3 group, led by Prof. Tikekar, has enough information.

**4:45 – 5:00 pm            Business meeting: Elect new secretary, locations for future meetings, CoFE/SoFE update**

Prof. Bell reminded the team that we need to talk about electing a new secretary and another official.

Prof. Bornhorst suggested that the steering committee election needs to be confirmed. A Google form will be sent via email for election.

Secretory candidate: Kiruba Krishnaswamy

Steering Committee Candidates: Rohan Tikekar, Ozan Cifti, Ashim Datta, Gonul Kaletunc, Roger Ruan, Pawan Takhar

Annual Meeting location 2025: Maryland

Other candidates for future meetings?

Indiana, ,Iowa and others?

Prof. Tikekar suggested it will be organized jointly by Maryland and Delaware next year. Details will explained.

Prof. Bornhorst reminded me to vote for one member per station. Google forms were submitted by members.

Results of the election

Steering committee members:

* Prof. Tikekar
* Prof. Cifti
* Prof. Takhar
* Prof. Dolan (Cont.)
* Prof. Bornhorst (Cont.)

Secretory: Prof. Krishnaswamy



**5:00- 6:00 pm             Transportation to dinner venue**

Soojin provided instructions on the dinner venue.

**6:00 – 8:00 pm Dinner (**[**Plumeria Beach House**](https://www.kahalaresort.com/dining/plumeria-beach-house/)**, 5000 Kahala Ave., Honolulu, HI, 96816)** [**https://g.co/kgs/AFE88E5**](https://g.co/kgs/AFE88E5)

**Tuesday, October 22**

**8:30 – 10:30 am Station Reports: Short updates from stations based on the alphabetical order of the station name.**

Station Reports

1. ***AR:*** *Prof. Ubeyitogullari presented the report for Arkansas Station.*

**Objective 1**

**Collaborations with other stations**

* Prof. Griffiths Atungulu collaborated with Purdue University station to characterize properties of arabinoxylans from long grain hybrid, long-grain pure line and medium grain rice cultivars with a goal of functionalizing them for film manufacturing and for various applications.
* Prof. Griffiths Atungulu collaborated with University of Wisconsin-Madison station to fractionate rice bran from long grain hybrid, long-grain pure line and medium grain rice cultivars with a goal of functionalizing them as pre- and probiotics adjuncts in animal feed.

**Areas Seeking Collaboration**

* Prof. Griffiths Atungulu has a project working on on-farm grain management using new and automated sensing technology for grain condition monitoring and automated fan control and is looking for collaboration in modeling.

**Objective 2**

**Collaborations with other stations**

* Prof. Ubeyitogullari collaborated with Purdue to analyze aerogel-based packaging materials and developed a USDA proposal together.
* Prof. Rahman collaborated with the University of Nebraska–Lincoln and Purdue University to develop a new method for protein hydrolysis and dry fractionation of cereal processing by-products.

**Areas Seeking Collaboration**

* Prof. Ubeyitogullari is working on the digestibility of protein aerogels, and he is looking for collaboration in protein/amino acid analyses, and applications of aroma-enhanced plant proteins.
* Prof. Rahman has a project on air classification and electrostatic separation of rice milling by-products and is looking for collaboration on lab-scale air classification and a triboelectric separator.

**Objective 4**

**Collaborations with other stations**

* Prof. Ubeyitogullari collaborated with Ohio station in developing a 3D food printing workshop pre-CoFE.
  + 3D Food Printing as a Prototyping and Processing Tool: Principles and Practical Considerations

1. ***CA:*** *Prof. Bornhorst presented the report for California Station*

**Objective 1**

**Collaborations with other stations**

* Prof. Bornhorst collaborated with MD Station (Tikekar) on characterization of *Salmonella* survival during simulated gastrointestinal digestion of food and emulsion systems

**Areas Seeking Collaboration**

* Prof. Bornhorst is looking for collaboration on multiscale imaging using MRI or other non-invasive technologies
* Prof. Nitin is looking for collaboration on starch characterization and AI modeling
* Prof. Gravelle is looking for collaborations on characterization and applications of structured lipids
* Prof. Bell is looking for collaborations on protein and phenolic characterization

**Objective 2**

**Collaborations with other stations**

* Prof. Nitin collaborated with Prof. Salvi (NC State) station to develop validation and verification of non-thermal plasma
* Prof. Nitin collaborated with Prof. Tikekar (UMD) for synergistic ultrasound processing and the team is finalizing a manuscript
* **Areas Seeking Collaboration**
* Prof. Nitin is seeking collaborations for sustainable biorefining of biomass

**Objective 3**

**Areas Seeking Collaboration**

* Prof. Bornhorst and Nitin are looking for collaboration in development of multiscale/ data-based models of digestion processes.
* Prof. Gravelle is looking for collaboration in applying mechanistic modelling to structured lipids

**Objective 4**

**Collaborations with other stations**

* Profs. Nitin & Bornhorst (UCD) collaborated with UMD-UNL et al. in development of the Multi-Institutional Seminar Course (UCD hosted zoom seminars and videos).
* Prof. Bornhorst (UCD) collaborated with NY station (Datta) in use and evaluation of online food science course materials in undergraduate food science courses.
* Prof. Nitin is continuing collaboration with UMD station (Tikekar) for virtual reality- enabled simulation of food processing operations. The team is working on completing manuscripts.

**Areas Seeking Collaboration**

* Prof. Bornhorst has developed online educational materials (undergraduate level) on food digestion and food functionality and is looking for collaboration to utilize online videos and materials (videos, quizzes, problem sets, activities).
* Profs. Nitin and Bell are seeking collaborations to develop Alt protein course and Prof. Nitin is seeking collaborations for integrating of data based modeling in teaching food engineering.

1. ***DE:*** *Prof.* Tan *presented the report for Delaware Station*

**Objective 1**

**Collaborations with other stations**

* Prof. Juzhong Tan has collaborated with local cocoa processor, United Cocoa Processor LLC, on characterizing the sensory, techno-functional, and textural properties of chocolate with cocoa substitutes (spirulina and maccha) and novel sweeteners (tagatose, stevia, and monk fruit sugar).

**Areas Seeking Collaboration**

* Prof. Juzhong Tan is seeking collaborations on develop health-promoting chocolate.

**Objective 2**

**Collaborations with other stations**

* Prof. Tan has collaborated with South Dakota State University on UV laser for food surface sanitation.
* Prof. Tan has collaborated with Maryland on using in-flight washer for the washing and sanitation of fresh produce.

**Areas Seeking Collaboration**

* Prof. Juzhong Tan is seeking collaboration on novel post-harvest washing technologies.

**Objective 3**

**Collaborations with other stations**

* Prof. Juzhong Tan collaborated with New York station on developing autonomous drip fertigation systems for hydroponics.
* Prof. Juzhong Tan collaborated with other Delaware faculties on using hyperspectral images for the rapid detections of stresses of leafy greens in hydroponics.

**Areas Seeking Collaboration**

* Prof. Juzhong is seeking collaborations on robotics, AI, and hydroponic productions.

1. ***GA:*** *Prof. Singh presented the report for Georgia Station.*

**Objective 1**

**Collaborations with other stations**

• Prof. Singh and Prof. Kong collaborated with the Missouri station

• Prof. Singh worked on High-pressure processing with the Texas station

**Objective 4**

**Collaborations with other stations**

• Prof. Kong collaborated with Prof. Shyam Sablani (Washington) and worked on an advanced food processing course

**Areas Seeking Collaboration**

• Prof. Singh is seeking to work on cold plasma with all stations

• Prof. Singh is also seeking collaboration for bioactive encapsulation and its fate in digestion

1. ***IA:*** *Prof. Lamsal presented the report for Iowa Station.*

**Objective 1**

**Collaborations with other stations**

* Prof. Silva collaborated with NC station in characterizing plasma-activated water
* Prof. Watrelot collaborates with UC-Davis in characterization phenolics compounds in wine with Waterhouse Lab

**Areas Seeking Collaboration**

* Prof. Lamsal seeks collaboration in biomanufacturing of functional biobased chemicals and characterizing thermo-physical properties of recombinant antifreeze proteins
* Prof. Gomes seeks collaboration in application of nanotechnology in food safety and quality
  + Sensor development, pathogen detection
* Prof. Silva seeks collaboration in application of cold plasma processing for food safety and quality and brewing technologies
  + Microorganism inactivation, hazardous compounds degradation.
  + Gluten free and low alcohol/non alcohol beer - product development
  + Prof. Watrelot seeks collaboration in extraction of phenolic compound, pomace valorization, and extension/ outreach to wine industry

**Objective 2**

**Collaborations with other stations**

* Prof. Silva collaborated with NC station in obtaining data (pH, nitrate, nitrite, hydrogen peroxide) from plasma activated water (PAW) to address knowledge gap in the area of cold plasma processing using different technologies.

**Areas Seeking Collaboration**

* Prof. Lamsal seeks collaboration in improved process optimization of food co-streams as fermentation media for biomanufacturing
  + TEA and costs
* Prof. Watrelot seeks collaboration in Extraction of phenolic compound, pomace utilization, and extension/ outreach to wine industry
* Prof. Silva seeks collaboration in waste packaging material decontamination
* Prof. Curtzwiler seeks collaboration in sustainable materials for packaging and coatings in the food industry: bio-based, compostable, and recycled polymers. **Objective 4**

**Collaboration with other stations**

* Prof. Lamsal was a co-PI in a proposal submitted to NSF- IUSE grant (Improving Undergraduate STEM Education from) on creating a professional support structure for UG students to network and learn from
  + Led by U Maine, and collaboration with ISU and 5 other universities (KY, ME, IA, VA, WA, IN) stations
  + Establishing and strengthening faculty-student-industry network that students can rely on throughout college years (and beyond)
  + Cross-disciplinary approach in Food Sciences (Food Chemistry, microbiology, Processing and Engineering)
* Lamsal adopted Guided Learning approach to numerical problem solving in food processing as shared by Prof. Datta (NY)
* Higher Education Challenge (HEC) Grant: Collaboration with 5 other universities (KY, ME, IA, VA, WA, ID) stations
  + Writing manuscripts on project implementation, and content improvement
  + Food processing teaching

**Areas Seeking Collaboration:**

* + Prof. Lamsal seeks collaboration on effective teaching methods and learning models to apply to Food Processing

1. ***IL:*** *Prof. Takhar presented the report for Illionois Station.*

**Objective 1**

**Collaborations with other stations**

* Prof. Yi-Cheng Wang is collaborating with Wisconsin station to develop sensors for monitoring the quality changes in meat products during storage.

**Objective 3**

**Collaborations with other stations**

* Prof. Kamruzzaman collaborated with Michigan State University, and Mississippi State University to develop data-driven optical sensing technology for sweet potato based on physical properties and other quality attributes.
* Prof. Takhar collaborated with Washington State University on combined microwave and conventional frying of foods. A prototype with two microwave power sources (2.45 GHz and 5.8GHz) was developed, and Hybrid Mixture theory Based multiscale modeling was performed.
* Prof. Takhar collaborated with University of Arkansas on pore-scale modeling of gas transport in a bed of low moisture foods (basil leaves). Regions not accessible to sterilizing gas were identified and recommendations to the industry were made.

**Areas Seeking Collaboration**

* Prof. Kamruzzaman is looking for collaboration in AI-driven data modeling with optical sensing data such as NIR spectroscopy and hyperspectral imaging.
* Prof. Takhar is seeking collaborations on solute/species transport in foods.

1. ***IN:*** *Prof. Mishra presented the report for Indiana Station.*

**Objective 1**

**Collaborations with other stations**

* Prof. Da Chen collaborated with Indiana station to measure the trout fillet quality attributes using textural analyzer, colorimeter and FTIR
* Prof. Dharmendra Mishra collaborated with the University of Arkansas station (Prof. Ali Ubeyitogullari) to submit NIFA grant on the properties of novel nanoporous aerogels for packaging applications.
* Prof. Dharmendra Mishra collaborated with the Michigan station (prof. Dolan) to submit NIFA grant on the use of modeling methods to improve low-moisture food safety at elevated temperatures (NIFA grant submitted).

**Areas Seeking Collaboration**

* Prof. Mishra and Prof. Dolan are looking to collaborate on measurement of thermal properties at elevated temperatures.

**Objective 2**

**Collaborations with other stations**

* Prof. Huang collaborated with Prof. Jung and Zhao in the Oregon station on a USDA AFRI grant to converting plant fiber-based biowastes into molded pulp packaging products and evaluate its environmental sustainability.
* Prof. Da Chen collaborated with [OH] station to develop advanced extrusion technique to reduce the cost and increase the quality of plant-based meat analog.
* Prof. Mishra collaborated with Prof. Vardhanabhuti (MO) and Prof. Nair (AR) and received funding from United Soybean Board for the Proposal “Building Infrastructure and Connectivity for Small and Medium Scale Processing of Soy-Based Value-Added Products: A Multistate Approach.”

**Objective 3**

**Collaborations with other stations**

* Prof. Da Chen collaborated with [ME] station to build techno-economic models for plant protein extraction and provide detailed economic feasibility of novel protein extraction approach.
* Prof. Dharmendra Mishra collaborated with the Michigan station (Prof. Dolan) to to estimate inactivation parameters.
* Prof. Corvalan collaborated with UMass station to model the chemistry of antioxidants using machine learning techniques
* Prof. Corvalan collaborated with UMass station to model additive manufacturing of foods using CFD mechanistic mathematical modeling

**Areas Seeking Collaboration**

* Prof. Mishra and Prof. Dolan are looking to collaborate in the area of inverse problems and parameter estimation.

**Objective 4**

**Collaborations with other stations**

* Prof. Huang participated in the NC-1023 Multi-institutional Food Engineering course and offered a course “Emerging Food Technologies” at Purdue.
* Prof. Da Chen collaborated with [ME, VA, IA, KY, WA] station in development of teaching modules involving in industry project and active learning strategy for STEM courses using Food Science as example.

1. ***KY:*** *Prof. Adedeji presented the report for Kentucky Station.*

**Objective 1**

**Collaborations with other stations**

* Prof. Adedeji collaborated with colleagues at University of Arkensas to develop AI based-nondestructive approach for meat quality evaluation – to predict meat freshness using the meat color as the ground truth in the hyperspectral image data and machine learning model development.

**Areas Seeking Collaboration**

* Prof. Adedeji is working on AI-based method to noninvasively detect dormant seeds, pre-malting to increase malt yield.
* Prof. Adedeji is also working on AI-based detection and quantification method for food allergens along the food supply chain.
  + Anyone with expertise in model deployment into handheld devices and APP.
* Open to collaborate with anyone seeking expertise in sensor data and machine learning application in food quality evaluation.

**Objective 4**

**Collaborations with other stations**

* Colleagues from six institutions [University of Maine (Lead), University of Kentucky, Iowa State, Purdue University, Washington State, and Virginia Tech] submitted an NSF IUSE grant to build on the findings from their USDA-HEC grant.
* We want to determine the impact of **industry partnership** and **project-based learning** on learning outcome for STEM courses in Food Science departments.
* The hypothesis is that these approaches will increase experiential learning and improve the readiness of food science students for industry assignment.

1. **MD:** *Prof. Tikekar presented the report for Maryland Station*

**Objective 1**

**Collaborations with other stations**

* Prof. Tikekar Collaborated with Prof. Bornhorst from California station to characterize survival of natural microbiome during simulated gastric digestion
* Prof. Tikekar collaborate with Prof. Blaustein, Prof. Bornhorst and Prof. Nitin to submit a proposal based on these results to USDA NIFA A1364.

**Areas Seeking Collaboration**

* Characterize metabolites produced by natural microbiomes in simulated ‘guts’

**Objective 2**

**Collaborations with other stations**

* Prof. Tikekar collaborated with Delaware and California stations to evaluate Biochar for improving produce yield, and soil and plant microbiome (USDA-NRCS project)
* Prof. Tikekar collaborated with Prof. Blaustein (microbial ecologist at UMD) to evaluate how CAP treatment affects the microbiome of basil plant

**Areas Seeking Collaboration**

* How processing technologies alter natural microbial communities of food ingredients

**Objective 4**

**Collaborations with other stations**

* Prof. Tikekar collaborated with MD, NE, NC, OH, IN, NY, CA, MN, TN, MO and other stations on NC-1023 multi-institutional seminar series.

**Areas Seeking Collaboration**

* Improve and refine the seminar series and explore collaboration on Extension activities
  + PCQI course
  + Science of Food Safety

1. **MI:** *Prof. Dolan present presented the report for Michigan Station*

**Objective 1**

**Collaborations with other stations**

* Prof. Dolan continues collaboration with Prof. Mishra (IN) to design and construct a commercial rapid test instrument to dynamically estimate temperature-dependent thermal properties of foods up to 140 oC in two minutes.

**Areas Seeking Collaboration**

* Profs. Dolan and Mishra are looking to collaborate with anyone who needs thermal properties of foods at temperatures up to 140 oC.

**Objective 2**

**Collaborations with other stations**

* Prof. Medina-Meza collaborated with Nebraska, Virginia, Oregon, Maine, Purdue, Iowa, and Mississippi stations in a collaborative project of Extraction of Bioactive compounds from grape pomace, with the aim to evaluate the effect of different food technologies in the extraction of phenolic compounds. A manuscript derived from his effort is in preparation.
* Prof. Medina-Meza, is collaborating with Prof. Ozan Ciftci (Nebraska) in a study to evaluate the impact of CO2 supercritical extraction on phytochemicals from quinoa
* Prof. Medina-Meza is collaborating with Prof. Balasubramanian (Ohio), in a study to evaluate the impacts of high-pressure processing on bioactive lipids (hormones, vitamins) from human breastmilk.
* Prof. Marks is PD on a USDA NIFA AFRI SAS grant ($9.8M), in collaboration with Profs. Tang and Zhu (WA), Subbiah and Matlock (AR), Harris (CA), Feng (IN), Scharff (OH), McGowen (NC), and Anderson and Grasso-Kelly (FDA), entitled Sustainable, Systems-Based Solutions for Ensuring Low-Moisture Food Safety.

**Areas Seeking Collaboration**

* Prof. Medina looking to collaborate in Food processing, food industry by-products and Extraction technologies.

**Objective 3**

**Collaborations with other stations**

* Prof. Marks (MI) is collaborating with Profs. Sindelar and Glass (WI) to develop novel approaches for modeling Salmonella lethality on the surface of fully-cooked meat and poultry products, via a USDA AFRI CARE project, entitled Supporting small and very small meat/poultry processors in complying with USDA FSIS regulatory changes for fully-cooked products.
* Prof. Dolan collaborated with Prof. Mishra (IN) in submitting a 2023 USDA AFRI grant proposal, “Advancing Use of Modeling Methods to Improve Low-Moisture Food Safety At Elevated Temperatures” (pending).
* Prof. Dolan collaborated with Prof. Mishra (IN) to publish a paper (2024): “Sequential estimation of inactivation parameters and bootstrap confidence intervals in unsteady-state conduction-heated foods. J. Food Engineering.”
* Prof. Yi collaborated with Prof. Nitin (CA) to submit a paper (2023): “AI-enabled biosensing for rapid pathogen detection: from liquid food to agricultural water. Water Research.”

**Areas Seeking Collaboration**

* Profs. Dolan and Mishra are looking to collaborate with anyone on estimation of parameters in mathematical models using data.
* Prof. Yi seeks collaborations on data-driven modeling, including classification/regression, time-series predictions, and custom models for high-dimensional datasets.

**Objective 4**

**Collaborations with other stations**

* Prof. Liu is collaborating with Prof. Datta (NY) on teaching FS students thermal processing using Datta’s simulation software.
* Prof. Mishra connected Prof. Dolan to co-teach BPCS with Prof. San Martin to Abbott Nutrition in VA in May, 2024.

**Areas Seeking Collaboration**

* Prof. Liu is looking to collaborate with anyone on evaluation of nutritional value of the fermented food ingredients in food processing.
* Prof. Yi seeks collaborations on AI/machine learning educational resources for food systems (currently teaches “ML for Biosystems Engineering”, blending math and programming).

1. MN: *Prof. Raun presented the report for Minnesota Station.*
2. **MO:** *Prof. Krishnaswamy presented the report for Missouri Station*

**Objective 2**

**Collaborations with other stations**

* Dr. Vardhanabhuti collaborated with Dr. Mishra (Purdue station) on small and medium scale soy processing of identity-preserved (IP) soybeans. MO station has developed sustainable small-scale processing of oil and alternative processing of protein from specialty soybeans.
* Dr. Krishnaswamy collaborated with Dr. Moncada (NC station) to quantify and develop sustainable processing methods for American Elderberries

(Obtained Funding: USDA-SCRI for American Elderberries)

**Areas Seeking Collaboration**

* Missouri Station (Dr. Vardhanabhuti ) is seeking collaboration on food ingredient functionality.

**Objective 4**

**Collaborations with other stations**

* Dr. Krishnaswamy collaborated with NC1023 Food Engineering Webinar aligning with BE/FS 4160 Food Process Engineering course.

**Areas Seeking Collaboration**

* Dr. Krishnaswamy plans to continue offering the Food Engineering webinar series.

1. **MS:** *Prof. White presented the report for Mississippi Station.*

**Objective 1**

**Areas Seeking Collaboration**

* Seeking collaboration-natural antimicrobials, characterization by-product and value-added utilization (sweet potatoes, blueberries, catfish etc.)

**Objective 2**

**Areas Seeking Collaboration**

* Cold plasma, HPP, X-ray, microencapsulation (Sam Chang)
* Rapid detection
* characterization by-product and value-added utilization (sweet potatoes, blueberries, catfish etc.)

**Objective 4**

**Areas Seeking Collaboration**

* Prof. White has created online food safety modules (FSOP-Food Safety Outreach Program, MPPTA-Meat and Poultry Processing Capacity-Technical Assistance, AMSA-American Meat Science Association), product development modules (9-universities/Pepsico) (HEC), K-12 teacher continuing education training workshops (HEC).

1. **NC:** *Prof. Salvi presented the report for North Carolina Station.*

**Objective 1**

**Collaborations with other stations**

* North Carolina Station (Dr. Moncada) will work with ND station (Dr. Clairmont Clementson)

**Areas Seeking Collaboration**

* North Carolina Station (Dr. Zheng) is seeking collaboration on food ingredient functionality.

**Objective 2**

**Collaborations with other stations**

* North Carolina Station (Dr. Salvi) collaborated with California station (Dr. Nitin) to develop a novel method for determining the dosimetry of plasma technologies.
* North Carolina Station (Dr. Salvi) collaborated with Oregon station (Dr. Wang) on cold plasma technologies.
* North Carolina Station (Dr. Salvi) collaborated with NJ station (Dr. Karwe), IA station (Dr. Silva), and SD station (Dr. Yang) on characterization of plasma-activated water.
* North Carolina Station (Dr. Yang) collaborated with Oregon Station (Dr. Wang) on the LCA/TEA project of non-thermal processing.

**Areas Seeking Collaboration**

* North Carolina Station (Dr. Salvi) is seeking collaboration in novel thermal and non-thermal processing technologies. Looking for a collaborator with a working high-pressure processing and extrusion units.
* North Carolina Station (Dr. Moncada) is seeking collaboration in the area of upcycling plant-based raw materials and industry byproducts for the development of functional ingredients and their incorporation into food model systems.
* North Carolina Station (Dr. Yang) is seeking collaboration on the sustainability assessment of non-thermal technologies in food processing.

**Objective 3**

**Collaborations with other stations**

* North Carolina Station (Dr. Salvi) collaborated with California station (Dr. Nitin) to develop machine learning for defining models the dosimetry of plasma technologies.

**Areas Seeking Collaboration**

* North Carolina Station (Dr. Salvi) is seeking collaboration in the modeling and simulation of cold plasma processing.

**Objective 4**

**Collaborations with other stations**

* North Carolina Station (Dr. Salvi) participated in NC1023 seminar series in Spring 2021, Spring 2022, Spring 2023, and Spring 2024.

**Areas Seeking Collaboration**

* North Carolina Station (Dr. Salvi) is looking forward to collaborating with other stations to offer the NC1023 seminar series in Spring 2024 and involving more stations in student surveys.

1. **ND:** *Prof. Clementson presented the report for North Dakota Station*

**Objective 3**

**Areas Seeking Collaboration**

* Prof. Clementson has a project on modeling heat induced quality variations of corn and is looking for collaboration for measurement nutrient composition post-drying

1. **NE:** *Prof. Ciftci presented the report for Nebraska Station.*

**Objective 1**

**Collaborations with other stations**

* Collaborated with Prof. Meza (MI) on the effect of conventional and supercritical carbon dioxide extraction on the phytochemical composition of quinoa lipids.
* Writing a manuscript with OR, MI, IN, VA, and MS stations on determination of the phenolic composition and the antioxidant properties of the grape pomace extract obtained by various conventional and unconventional extraction methods.

**Areas Seeking Collaboration**

* Characterization of protein and lipid ingredients and their functionalization toward improved food applicability.
* Multiscale analysis of food structures to develop a mechanistic understanding related to polymer-polymer interactions.

**Objective 2**

**Collaborations with other stations**

* Writing a manuscript with OR, MI, IN, VA, and MS stations on determination of the phenolic composition and the antioxidant properties of the grape pomace extract obtained by various conventional and unconventional extraction methods.

**Areas Seeking Collaboration**

* Downstream process development for fermentation.
* Dry and wet extraction development for plant-based proteins.

**Objective 3**

**Areas Seeking Collaboration**

* Using machine learning approaches for optimization and predictive modeling of the processes for dry and wet extraction development for plant-based raw materials.

**Objective 4**

**Collaborations with other stations**

* Collaborated MD, NE, NC, OH, IN, NY, CA, MN, TN, MO and other stations on NC-1023 multi-institutional seminar series.
* Collaborating with Prof. Gail Bornhorst (CA) to co-edit a special issue on “Role of food engineering in improving human health” for Elsevier.

**Areas Seeking Collaboration**

* Looking for collaborations in various Educational and Workforce Development Activities within an NSF Global Center project, such as center-wide workshops/seminars and engaging undergraduate and graduate students from the center’s international partner institutions in the NC1023 multi-institutional food engineering course series.

1. **NJ:** *Prof. Karwe presented the report for New Jersey Station.*

**Objective 1**

**Collaborations with other stations**

* + Mukund Karwe (New Jersey) collaborated with Deepti Salvi (North Carolina) to characterize plasma activated water (PAW).

**Areas Seeking Collaboration**

* + Mukund Karwe (New Jersey) and Nitin Nitin (California) are working on “post-biotics”. They are hoping to submit a proposal to NIFA on this topic.

**Objective 3**

**Areas Seeking Collaboration**

* + Mukund Karwe (New Jersey) and Nitin Nitin (California) are working on “A robust model for predictive digestion and precision nutrition in human GI Tract”. They hope to develop a proposal in this area next year.

1. **OH:** *Prof. Kaletunc presented the report for Ohio Station.*

**Objective 2**

**Collaborations with other stations**

* Prof. Heldman collaborated with Dr. Snyder, Cornell University to ensuring sanitary environments for dry food manufacturing.
* Prof. Balasubramaniam together with Dr. Heldman collaborated with Dr. Snyder, Cornell University station to investigate
  + microbial efficacy of superheated steam as a cleaning and sanitation technology for dry food processing plant environment.
  + the synergy of combining superheated steam with UV-C light on the inactivation of *Enterococcus faecium* and Geobacillus stearothermophilus spores on stainless steel.
* Prof. Sastry collaborated with Dr. Setlow, Uconn Health to investigate inactivation of sporeformers under ohmic heating.
  + Constant electric field strengths of 50 V/cm rapidly inactivated spores of Clostridium sporogenes both in buffer and in a green bean puree matrix.
  + Samples processed by ohmic heating showed superior quality attributes and color retention compared to conventionally heated samples.

**Objective 3**

**Collaborations with other stations**

* Prof. Sastry collaborated with Dr. Setlow, Uconn Health to investigate ohmic heating of foods within pouches and develop models to improve electric field distribution, and used to process green bean puree.

**Objective 4**

**Collaborations with other stations**

* Prof. Kaletunc collaborated on delivering a 3D printing workshop of CoFE 24 together with Arkansas Station Dr. Ubeyitogullari and the University of Guelph Dr. Corradini.

1. **OR:** *Prof. Zhao presented the report for Oregon Station.*

**Objective 1**

**Collaborations with other stations**

* OSU has worked with other stations in characterizing properties of byproducts from winemaking, and are leading the efforts in characterizing a wide range of agri-food byproducts from juice, wine, coffee, hemp, tree nuts, etc.

**Areas Seeking Collaboration**

* Looking for collaboration to expand the utilization of both liquid and solid agri-food byproducts as functional food ingredients, fibers for packaging, and other value-added utilizations, and better tool to characterize the materials.
* Seeking collaboration to develop a zero-waste solid strategy for advancing a circular bioeconomy and biobased economy using agricultural and food processing byproducts.

**Objective 2**

**Collaborations with other stations**

* OSU collaborated with New Mexico and submitted a NIFA SAS proposal for achieving zero-waste of fiber based agri-food byproducts.
* Prof. Jung and Prof. Zhao are collaborating with Purdue University to conduct life cycle assessment of sustainable packaging using materials extracted from agri-food byproducts.
* Prof. Jung collaborated with Nebraska to submit a NIFA SAS proposal aimed at developing an AI-integrated framework that leverages ALW for value-added food product innovation and advancing sustainable agripreneurship (SA), enhancing the economic and environmental sustainability of rural and underserved communities.
* Prof. Wang collaborated with California and Maryland on a proposal in valorization of byproducts for antifungal applications in plant pathogen control.
* Prof. Wang collaborated with North Carolina on a manuscript in evaluating energy efficient nonthermal options for industrial sustainability, and on a proposal focused on improving drying efficiency for fruits and nuts.
* Prof. Wang collaborated with Washington on a project utilizing UV technologies for postharvest plant pathogen control in tree fruits.

**Areas Seeking Collaboration**

* Looking for collaborations in large grant proposals for promoting sustainable food manufacturing, including processing technologies, utilization of agri-food byproducts, LCA, TEA, etc.

**Objective 4**

**Collaborations with other stations**

* OSU collaborated with New Mexico in developing novel student learning and workforce training methods as part of NIFA SAS proposal.
* OSU collaborated with Nebraska in developing multi-state, non-credit online courses in AI-enabled agripreneurship, experiential learning labs for undergraduate and graduate students in the participating institutes, structure near-peer mentoring opportunities as part of NIFA SAS proposal.

**Areas Seeking Collaboration**

* Prof. Wang would like to hear other station’s opinions in developing a short course in sustainable and smart manufacturing for the food industry.

1. **PA:** *• Prof. Anantheswaran sent the report for Pennsylvania Station*

**Objective 2**

**Collaborations with other stations**

* Prof. Anantheswaran completed a collaborative project on “Assessing the stability of polyfunctional thiols in hops and beer throughout the brewing process”. He has initiated another project on “Vacuum drying of hemp”.
* Prof. Demirci is working on pulsed UV light technology to eliminate microorganisms in foods. He has submitted proposal to USDA NIFA to study decontamination of packaging materials by pulsed UV. Another project related to the recycling of waste bread was initiated and a proposal has been submitted to USDA NIFA.

**Objective 4**

**Collaborations with other stations**

* Prof. Anantheswaran is developing Virtual Labs for the 3-credit Food Engineering class being taught to Food Science students.

1. **SD:** *Prof. Muthu presented the report for South Dakota Station.*

**Objective 1**

**Collaborations with other stations**

* In collaboration with Washington Station, Prof. Ren Yangis measuring the thermal resistance of various foodborne-pathogens in isothermal and constant humidity environments that relevant to baking and roasting process.

**Areas Seeking Collaboration**

* Profs. Muthu, Ren Yang and Lin Wei have a project working on inactivation of food pathogens (e.g., *Escherichia coli*, *Salmonella Cerro*, *Salmonella Dublin*, and Enterotoxigenic *Escherichia coli*) on surfaces of  fresh foods using atmospheric cold plasma and is looking for collaboration in characterization of bacteria reduction and food quality changes after treatments.

**Objective 2**

**Collaborations with other stations**

* Prof. Lin Wei collaborated with Dr. Abdus Sobhan at Mississippi station to develop food safety capacity building for empowering local farmers to promote sustainable safe foods supplies and health communities in Mississippi.

**Areas Seeking Collaboration**

* Prof. Lin Wei has a project working on developing biopolymer-based nanocomposites for smart food packaging and is looking for collaboration in sensor/biosensor and IoT applications.

**Objective 3**

**Areas Seeking Collaboration**

* Prof. Ren Yang has a project on modeling the microbial inactivation kinetics of atmospheric cold plasma (DBD and Bubble-sparkling Discharge) in water treatment. He is looking for collaboration for monitoring the concentration of ozone and other reactive species in liquid or gaseous phase.

**10:30 – 10:45 am *Break***

**10:45 am – 12:00 pm Station Reports: Short updates from stations (5 min/station)**

Prof. Dan Farkas was remembered.

The group discussed the Conference of Food Engineering 2026 in Hawaii. Prof. Kaletunc discussed possible locations and times (with the possibility of changing from August). The team suggested early August.

The discussion also included for 2026 NC1023 meeting SD, Iowa, Purdue

Prof. Karwe talked about the classification of food for Ultra-processed food. Revisit NOAA classification. A possible white paper can be written by the group. Prof. Karwe and Prof. Nitin will take the lead.

**12:00 pm Box lunch/adjon**