LOUISIANA BOARD OF REGENTS
BOARD OF REGENTS SUPPORT FUND

RESEARCH & DEVELOPMENT PROGRAM

REVIEW OF COMPETITIVE PROPOSALS SUBMITTED FOR FUNDING CONSIDERATION IN THE INDUSTRIAL TIES RESEARCH SUBPROGRAM (ITRS)

FY 2020-21 COMPETITION

March 2021

REPORT OF THE FINAL PANEL
BOARD OF REGENTS SUPPORT FUND
INDUSTRIAL TIES RESEARCH SUBPROGRAM
FY 2020-21

BACKGROUND INFORMATION

Twenty-nine research proposals requesting a total of $2,405,702 for the first year of work were submitted for funding consideration during fiscal year (FY) 2020-21 in the Industrial Ties Research Subprogram (ITRS) component of the Board of Regents Support Fund (BoRSF). A three-phase evaluation process conducted exclusively by out-of-state experts was used to review these proposals.

REVIEW PROCESS

Phase I: In-Depth Mail Review

The twenty-nine proposals were reviewed for scientific and technical merit, as well as for their potential to contribute to Louisiana's economic development and diversification, by twelve out-of-state experts. The experts included two reviewers in each of the following four targeted industry sectors: Advanced Materials and Manufacturing; Life Sciences and Bioengineering I; Coastal and Water Management; and Clean Technology and Energy. Each subject-area reviewer independently evaluated and prepared an in-depth evaluation form for each assigned proposal in the subject area. No proposals were submitted in the Life Sciences and Bioengineering II or Digital Media and Enterprise Software targeted sector.

Phase II: Reviewer Consensus Evaluation

After each reviewer independently assessed each assigned proposal, members of the various subject-area groups communicated with each other to arrive at a consensus ranking of proposals within each subject area. Proposals were placed in one of three categories:

1. Priority One: Highly Meritorious Proposals Recommended for Funding;

2. Priority Two: Meritorious Proposals of a Lower Priority; and

3. Priority Three: Do Not Fund as Submitted.

All evaluation forms from out-of-state experts who participated in Phases I and II of the review process were available to each member of the final panel, along with all proposals submitted. Each member of the final panel read and studied each proposal and each evaluation prior to the final panel's meeting.

Phase III: Final Panel Review

Three out-of-state experts participated in Phase III of the review process and served on the final panel. The panel convened on February 10, 2021, to discuss Phase I and II subject-area evaluations, prioritize proposals, and develop funding recommendations. The final panel considered each of the twenty-nine active proposals extensively and based its recommendations on the following criteria:

A. Scientific and technical merit;

B. Potential to enhance economic development and/or diversification in Louisiana;

C. Evidence of private-sector involvement; and

D. Evidence of innovation and ability to advance Louisiana's scientific, engineering, and/or technological bases.

The panel was informed that a maximum of $496,000 in first-year funds would be available for new research projects funded through the ITRS in FY 2020-21, and that money to continue the second and/or third years of multi-year projects recommended for funding would be budgeted separately from this amount. As a result of the final panel's deliberations, eight (8) proposals were recommended for funding, including two proposals recommended should a higher-ranked proposal vacate its position or additional funds become available. These eight (8) Priority One proposals are listed in **Appendix A**, immediately following the narrative section of this report. The final rankings and selections for awards were based upon individual ratings of the external reviewers (Phase I), consensus rankings of the subject-area reviewer groups (Phase II), and the final panel's consensus evaluation (Phase III), taking into account the economic potential of each project.

Five (5) other highly meritorious proposals considered during the final panel meeting but, for a variety of reasons, not recommended for funding are listed in **Appendix B**. The applicants whose proposals are listed in Appendix B should closely review the panel's comments. The final panel believes that these investigators should be notified of their good work and encouraged to revise and resubmit their proposals in the future, with the prospect that improvements in proposal content could ultimately lead to an award. The proposals listed in Appendix B should not be funded this year. The BoRSF would be better served by diverting any available funds not awarded to and/or unclaimed by Priority One projects to other R&D program component(s).

Three (3) other proposals were considered meritorious by both the subject-area reviewers and the final panel, but were insufficiently developed in one or more areas to be worthy of funding at this time (Priority Two).

Each of the remaining proposals, although meritorious in some respects, was deemed inconsistent with the goals and purposes of the ITRS and/or seriously deficient in one or more areas (Priority Three). The principal investigators who submitted these proposals are encouraged to submit them to other, more appropriate funding programs or to make significant revisions before considering resubmission to the ITRS.

The panel recommends that the Board of Regents commit funding to each new proposal for a maximum of three years, with renewal in the second and third years made contingent upon satisfactory progress as well as reconfirmation of continued external matching funding. External stipulations and

institutional matching requirements applicable in general to the eight (8) Priority One proposals are contained in **Appendix C (C.1).** The specific levels of outside funding required and detailed stipulations or conditions applicable to each proposal are included in the discussion of the eight (8) Priority One proposals listed in **Appendix C (C.2).** Summary statements have also been provided in **Appendix C** for each meritorious ITRS proposal ranked Priority One by the subject-area panels and considered by the final panel but not recommended for funding **(C.3)**, and each Priority Two proposal **(C.4)**. These summaries include the following information for each proposal:

1. Proposal number and title;

2. Strengths and weaknesses of the proposal;

3. Potential economic impact on Louisiana; and

4. Recommended BoRSF funding level and funding stipulations, as applicable. (***Note:*** This information is provided only for the eight proposals recommended for funding and included in Appendix C.2).

A general statement on proposals ranked Priority III by the final panel is included in **Appendix C (C.5)**.

The individuals who participated in Phases I and II of the review process are listed in **Appendix D**.

In-depth mail reviews will be provided as feedback to all applicants in July 2021.

FINAL PANEL RECOMMENDATIONS

To Phase I and Phase II Subject-Area Reviewers:

Reviewers should be commended for their performance in accordance with the guidelines set forth in the FY 2020-21 Request for Proposals.

To the Applicants:

Both the grant applicants and institutional administrations should be commended for their efforts to obtain industrial support and for proposing research in areas with high economic potential. However, several of the proposals were not supported by strong research plans. Successful grants in this program have historically had:

1. A testable scientific hypothesis and supporting preliminary data;
2. Demonstrated research experience among the project team in the proposed field of study;
3. A carefully prepared budget request with thorough justifications of proposed expenditures;
4. Active participation of an industry partner in the research and commercialization activities;
5. A reasonable industry match that, where possible, includes both in-cash and in-kind support;
6. When appropriate, institutional support in the form of faculty release time, deferment of graduate student tuition & fees, and significant contributions to research supplies, equipment, and student travel; and
7. For proposals being resubmitted changes highlighted which are believed to have made the proposal more competitive.

Future proposals submitted would benefit from addressing these elements.

To the Board of Regents (General Recommendations):

Over the years there has been a substantial improvement in ITRS applicants obtaining industry and non-academic support as well as developing solid research plans. It is important to encourage these improvements through the following (5) processes:

1. Continue to provide workshops and seminars for faculty on proposal preparation and requirements; development of consortia and cooperative research centers; patent and licensing procedures; and technology transfer to commerce.

2. Ensure that funded projects obtain the required industrial matching support. Principal investigators should be required to document acquisition of the recommended levels and types of industrial matching support by June 30, 2021, for the mandated first-year matching commitments; by March 31, 2022, for the required second-year match; and by March 31, 2023, for the required third-year match. The staff of the Board's Office of Research and Sponsored Initiatives should further promote recognition around the State that the ITRS not only encourages but requires industrial and/or federal governmental support as a condition for funding. Significant external funding is often necessary to purchase equipment and to fund salaries.

3. Notify applicants that literature reviews, the development of databases, and the drafting of research protocols should take place prior to submission of a proposal. These activities should not be funded by the ITRS.

4. Notify applicants that the industrial support obtained should be incorporated into the budgets of proposals under the appropriate line items.

5. Where appropriate, request applicants to include more detailed information regarding current and potential intellectual property rights related to their proposals.

APPENDIX A
ITRS PROPOSALS HIGHLY RECOMMENDED FOR FUNDING
(PRIORITY ONE) (8)

Rank	Proposal No.	Institution	Recommended BoRSF 1st Year Funds	Recommended BoRSF 2nd Year Funds	Recommended BoRSF 3rd Year Funds
1	003B	LSU A&M	$ 69,575	$ 67,275	$ 65,975
1	024B	ULL	64,214	63,591	59,992
1	004B	LSU A&M	75,254	70,254	70,254
1	013B	LSU A&M	88,351	86,393	78,851
5	007B	LSU A&M	84,321	73,514	73,514
6*	011B	LSU A&M	109,820	96,270	96,270
7	017B	LA-TECH	83,069	83,069	82,069
8	025B	ULL	100,644	97,035	97,035
TOTAL			**$ 675,248**	**$ 637,401**	**$ 623,960**

***Note: Availability of funds for those proposals below this point is uncertain at this time.**

APPENDIX B**
MERITORIOUS ITRS PROPOSALS RANKED PRIORITY ONE BY THE SUBJECT-AREA PANELS AND CONSIDERED BY THE FINAL PANEL BUT NOT RECOMMENDED FOR FUNDING (5)

010B 014B 018B 019B 022B

***Note:* ****The panel's comments on these proposals are provided in **Appendix C.3.** Subject-area panel reviews for each of these proposals will also be provided to the applicant in July 2021.

APPENDIX C
MERITORIOUS ITRS PROPOSALS OF LOWER PRIORITIES
(PRIORITY TWO) (3)**

002B 005B 008B

***Note:* **The panel's comments on the proposals ranked Priority Two are provided in **Appendix C.4.** The subject-area panel reviews of these proposals will be provided to the applicants in July 2021.

PRIORITY THREE* (13)**

001B 020B
006B 021B
009B 023B
012B 026B
015B 027B
016B 028B
029B

Note: ***These proposals are not listed in rank order of merit and are not recommended for funding as currently submitted. The final panel's general comments on the proposals ranked Priority Three are provided in **Appendix C.5.** Subject-area panel reviews for each proposal will be provided to the applicant in July 2021.

APPENDIX C.1

GENERAL EXTERNAL AND INSTITUTIONAL MATCHING REQUIREMENT STIPULATIONS FOR ITRS AWARD RECIPIENTS

External (i.e., industrial or approved governmental) and institutional funding commitments may not be reduced below levels pledged in the original proposal unless reductions are specifically permitted in the funding stipulations for a grant. In some cases, additional external funding over and above that pledged in the proposal (see Appendix C.2) may be required. The types and amounts of additional required funding are specified in the funding stipulations for the affected awards. **Unless otherwise indicated, all awards are contingent upon receipt by the Board no later than June 30, 2021, of updated documentation from the provider(s) of the external match reconfirming commitment of the match pledged in the proposal. Furthermore, second-year funding will be contingent upon receipt by the Board no later than March 31, 2022, of updated documentation from the provider(s) of the external match reconfirming commitment of the required second-year external match. Third-year funding will be contingent upon receipt by the Board no later than March 31, 2023, of updated documentation from the provider(s) of the external match reconfirming commitment of the required third-year external match. Letters (originals) from the private-sector partner(s) or government agency providing the required match must be furnished to the Board on company or agency letterhead and signed by authorized representatives of the companies or agencies by these same dates.**

Although budget requests from the Board of Regents Support Fund have been reduced significantly in some cases, no budget has been reduced to a degree that would impair execution of the proposed research and accomplishment of the project goals**; therefore, funding for each recommended Priority One project is made contingent upon full and complete execution of the work plan delineated in the proposal.**

APPENDIX C.2
COMMENTS AND FUNDING STIPULATIONS FOR
PROPOSALS HIGHLY RECOMMENDED FOR FUNDING
(PRIORITY ONE)

Proposal 003B **Rank: 1**

TITLE: *High-Temperature Polymer Electrolyte Membrane (HT-PEM) Pumps for Clean Hydrogen Extracted from Hydrocarbon Mixtures*

INSTITUTION: Louisiana State University and A&M College

PRINCIPAL INVESTIGATOR: Christopher Arges, Ph.D.

COMMENTS: Purified hydrogen is a chemical commodity important to numerous chemical manufacturing activities across the State of Louisiana, e.g., ammonia synthesis via Haber Bosch, ultra-low sulfur diesel fuel production, upgrading other petrochemical intermediates and products via hydrogenation, refining metals, and as a coolant for turbo generators used to produce stationary power. High-temperature polymer electrolyte membrane (HT-PEM) electrochemical hydrogen pumps (ECHPs) represent a modular and robust solution for generating pure hydrogen on industrial sites with challenging mixtures.

Louisiana State University and A&M College, in collaboration with Pajarito Powder, LLC , Albuquerque, NM, will devise new membrane electrode assemblies with targeted electrocatalysts that generate pure hydrogen from hydrocarbon mixtures. The proposed research investigates HT-PEMs for electrochemical pumps operated at 200 °C or greater for producing pure, i.e., clean hydrogen from hydrocarbon-contaminant mixtures found in industrial processes. LSU has invented a new class of HT-PEMs that has excellent thermal stability and proton conductivity up to 220°C. The new membrane materials are superior to the industrial benchmark based upon phosphoric acid containing polybenzimidazole membranes. Most of the work will be to determine the conditions under which H_3PO_4 is removed from the binder. The research approach is well described and should lead to a good chance of success. The proposed budget appears appropriate. Industry partner Pajarito Powder, LLC pledged in-kind support valued at $20,000 (materials and labor) for year one with no specifically stated support for year two and year three. The proposed budget does, however, indicate annual private-sector support of $20,000 for year two and year three. Therefore, prior to funding, the Pajarito Powder, LLC letter of support should be revised to reflect continued annual support of $20,000 for year two and year three. It is the panel's recommendation that the proposed research be funded at the level requested, i.e., $69,575 for year one, $67,275 for year two, and $65,975 for year three. The PI is required to maintain support for graduate research assistants (GRAs) and students at the level proposed in the original budget for each year of the project.

As a condition of funding, the types and amounts of the institutional and external matching commitments stated in the proposal should be maintained <u>in full</u>. Funding is contingent upon receipt by the Board no later than June 30, 2021 of updated documentation showing support at the levels indicated in the original proposal and as required in Appendix C.1.

BUDGET	BoRSF	EXTERNAL
1st Year	$69,575	$20,000 as specified in the proposal
2nd Year	$67,275	$20,000 as specified in the proposal
3rd Year	$65,975	$20,000 as specified in the proposal

Appendix C.2 (continued)

Proposal 024B **Rank: 1**

TITLE: *Secure and Efficient Power Delivery and Management in Modern Electric Power Grids*

INSTITUTION: University of Louisiana at Lafayette

PRINCIPAL INVESTIGATOR: Farzad Ferdowsi, Ph.D.

COMMENTS: Energy efficiency and security are of importance in contemporary power systems due to the high level of dynamics in power sources and power electronic-based components (PEC). About 2700MW of large-scale solar PVs are planned to become operational within the next few years in Louisiana; however, the grid-support functions of solar inverters are not well understood. Additionally, the communication links among such distributed resources are prone to cyber attacks. Moreover, power systems in the state of Louisiana have always faced natural disasters such as floods and hurricanes.

The University of Louisiana at Lafayette (ULL) will work with Louisiana State University and A&M College (LSU), McNeese State University (MSU), and Entergy, Inc., Baton Rouge, LA, to provide realistic solutions to current and future problems, thus enhancing the energy delivery and management in contemporary power systems. Developing intelligent control strategies to ensure the reliable, resilient, and stable operation of future power grids is of great importance to Louisiana as well as the country. The investigators will establish awareness through feature extraction with a classifier, self-healing through resilience quantification, and validation of hardware in three microgrids. Studies will include both simulations and hardware tests. Using the controller hardware in the loop will decrease possible damages to the actual power components within the grid while providing a realistic small-scale testing environment with a high time resolution (micro-second). This is an excellent group of well-funded investigators in synergistic areas who will work well together in the proposed research. The project budget appears appropriate. Industry partner Entergy, Inc. agrees to provide in-kind support (cost of data requested and engineering consultation related to project deliverables) of $66,000 over the three-year period. Two (2) subcontracts will be issued (to LSU and MSU) related to project research. It is recommended that the project be funded at the level requested, i.e., $64,214 for year one, $63,591 for year two, and $59,992 for year three. The PI is required to maintain support for graduate research assistants (GRAs) at the level proposed in the original budget for each year of the project.

As a condition of funding, the types and amounts of the institutional and external matching commitments stated in the proposal should be maintained <u>in full</u>. Funding is contingent upon receipt by the Board no later than June 30, 2021 of updated documentation showing support at the levels indicated in the original proposal and as required in Appendix C.1.

BUDGET	BoRSF	EXTERNAL
1st Year	$64,214	$28,001 as specified in the proposal
2nd Year	$63,591	$28,001 as specified in the proposal
3rd Year	$59,992	$28,127 as specified in the proposal

Appendix C.2 (continued)

Proposal 004B **Rank: 1**

TITLE: *Cationic Carbonylation Catalyst Development for Safer and More Efficient Chemical Processes at Lower Pressures*

INSTITUTION: Louisiana State University and A&M College

PRINCIPAL INVESTIGATOR: Matthew Chambers, Ph.D.

COMMENTS: The petrochemical and energy industries in Louisiana account for over $70 billion annually in sales and are the largest employers in Louisiana's manufacturing sector. A major industrial process is hydroformylation, in which alkenes, carbon monoxide, and hydrogen are converted into aldehydes, which are used to generate surfactants, plasticizers, solvents, lubricants, and other chemical intermediates. Three large hydroformylation plants are operational in Louisiana: ExxonMobil (Baton Rouge), Shell (Geismar), and Dow (Taft). The Shell hydroformylation plant uses high-pressure cobalt technology (~250 bar), which is very energy intensive. Dr. George Stanley, co-principal investigator, recently reported a cationic cobalt catalyst system with comparable activity to very expensive rhodium catalysts, while operating at medium pressures (50 bar). As the first major hydroformylation discovery in decades, the catalyst is uniquely active for branched internal alkenes used within industrial processes that are very difficult to hydroformylate.

The proposed research represents a partnership between Louisiana State University and A&M College (LSU) and Shell Co. (Taft, LA) to improve a hydroformylation process at low pressure through optimization of a catalyst derived from an innovation at LSU. LSU will optimize the catalyst through ligand variations, metal alternatives, and substrate surveys. *In situ* spectroscopies will probe the mechanism to aid in optimizations. Protocols for catalyst recovery and recycling will be pursued. Promising catalysts will be evaluated using flow reactor systems by Shell, Co. Other carbonylation reactions important to industry will be assayed to explore the scope of these new cationic catalysts. It is proposed that this will be less energy-intensive and more environmentally friendly. The economic discussion is strong. The project has a good research plan. The work with nickel-based catalysts should be carefully reviewed by University Health & Safety officials prior to its start because of potential toxicity. The overall budget is acceptable, less supplies, which appear inflated. Industry partner Shell, Co. pledges in-kind support valued at $50,000 for year one. The proposed budget did not include private-sector support for year two and year three. Therefore, prior to funding, the proposed budget and Shell, Co. letter of support must be revised to provide support at a minimum of $30,000 annually for year two and year three. It is also recommended that the proposed budget be revised to limit supplies costs to $15,000, resulting in a year one budget of $75,254. Budgets of $70,254, which limit supplies costs to $10,000 per year, are recommended for year two and year three. The PI is required to maintain support for graduate research assistants (GRAs) and undergraduate students at the levels proposed in the original budget for each year of the project.

As a condition of funding, the types and amounts of the institutional and external matching commitments stated in the proposal should be maintained <u>in full</u>. Funding is contingent upon receipt by the Board no later than June 30, 2021 of updated documentation showing support at the levels indicated in the original proposal and as required in Appendix C.1.

BUDGET	BoRSF	EXTERNAL
1st Year	$75,254	$50,000 as specified in the proposal
2nd Year	$70,254	$30,000 minimum as specified
3rd Year	$70,254	$30,000 minimum as specified

Appendix C.2 (continued)

Proposal 013B **Rank: 1**

TITLE: *Application of Distributed Fiber Optic Sensing for Sand Detection in Offshore Production*

INSTITUTION: Louisiana State University and A&M College

PRINCIPAL INVESTIGATOR: Jyotsna Sharma, Ph.D.

COMMENTS: Sand production is an important asset integrity concern as it can cause significant damage to a well's production equipment, both in the wellbore and at the surface facility, possibly requiring the well to be shut down, be curtailed or undergo expensive repairs. Loose sand can enter wellbores from reservoir formation, frac sand, proppant, or gravel pack material, and can be mobilized along the production stream at certain operating conditions and fluid properties. Sand control is especially critical for offshore producers due to the high production and injection rates, weekly consolidated reservoir sands, high-pressure conditions, and long completion intervals. Sand erosion of downhole and subsea equipment can increase the risk of catastrophic failure, which can cost operators tens of millions of dollars annually. The objective of the proposed research is to develop workflows to identify sand ingress location, volume, and transport velocity along the entire well in real time using fiber optic sensors to improve the sand mitigation strategy and minimize the environmental, monetary, and production impacts from sand in offshore production. In this study, an integrated system comprising optical-fiber-based distributed temperature (DTS) and acoustic sensors (DAS) will be utilized to estimate the sand ingress profile and transport velocity in real time along the entire wellbore using signal processing and machine learning techniques. The sand profile and velocity will be independently validated using a computational fluid dynamics model, which can be scaled up to field conditions for scenarios that are hard to measure in lab-scale experiments. Unlike conventional gauges, fiber optic sensors do not require downhole electronics, are chemically passive and corrosion resistant, and enable measurement simultaneously along the entire fiber. Analysis workflows will be demonstrated on experimental DTS and DAS datasets collected from surface flow-loop experiments and full-scale 5000 foot wellbore under variable fluid rates, sand size, inclination, and sand loading conditions to study sand transport behavior.

The proposed research represents a collaboration between the Louisiana State University and A&M College (LSU), Shell, Co. (New Orleans, LA), and Derrick Equipment Co. (Houston, TX). Industry partner Shell, Co. pledges in-kind support (test design and data analysis) valued at $20,000 per year. Derrick Equipment Co. pledges in-kind support (equipment) valued at $38,000 for year one of the project. Derrick is an excellent partner for the proposed research and future intellectual commercialization. The proposal is well written with a solid research plan and a clear potential impact on LA's economy. *It is the panel's opinion that Derrick's pledged in-kind equipment support would be more appropriate in year two of the project, rather than in year one. The proposed budget should be revised to reflect this change. The project budget appears appropriate. It is recommended that the project be funded at the level requested, i.e., $88,351 for year one, $86,393 for year two, and $78,851 for year three. The PI is required to maintain support for graduate research assistants (GRAs) at the level proposed in the original budget for each year of the project.

As a condition of funding, the types and amounts of the institutional and external matching commitments stated in the proposal should be maintained <u>in full</u>. Funding is contingent upon receipt by the Board no later than June 30, 2021 of updated documentation showing support at the levels indicated in the original proposal and as required in Appendix C.1.

BUDGET	BoRSF	EXTERNAL
1st Year	$88,351	*$58,000 as specified in the proposal
2nd Year	$86,393	$20,000 as specified in the proposal
3rd Year	$78,851	$20,000 as specified in the proposal

Appendix C.2 (continued)

Proposal 007B **Rank: 5**

TITLE: *Prevention and Control: Curtailing Pathogenic Vibrio spp. with Probiotics in Louisiana Oyster Hatcheries*

INSTITUTION: Louisiana State University and A&M College

PRINCIPAL INVESTIGATOR: Aixin Hou, Ph.D.

COMMENTS: The oyster industry is economically and culturally important to the state of Louisiana. Hatcheries are key to the sustainable husbandry of oysters on the Gulf Coast owing to the deterioration and/or overexploitation of their natural habitats. Pathogenic bacteria, particularly virulent and invasive *Vibrio* spp., are commonly associated with both larval and broodstock disease in aquaculture facilities. This issue has been evidenced at the Louisiana Sea Grant Oyster Research Lab and at oyster farms, where infiltration by *Vibrio* spp. has at times decreased larval survivorship. Control of these pathogens with antibiotics leads to the development of resistance to the drugs and is widely discouraged. Thus, a method to safely control *Vibrio* spp. within oyster hatcheries is urgently needed.

Louisiana State University and A&M College (LSU), in collaboration with Triple N Oyster Farm, proposes to determine the feasibility of *Bdellovibrio* and like organisms (BALOs) as a biological disease prevention and control agent against vibriosis in commercial oyster hatchery settings. The overall goal of the proposal is to eliminate pathogenic *Vibrio* species from oyster farms using ecologically sound methods containing no antibiotics. It is noted that BALOs have been shown to be effective in shrimp aquaculture, coral reefs, and fish production for filleting. Specifically, the research team will identify pathogenic *Vibrio* strains in hatcheries, isolate from Gulf water predatory BALOs that can effectively prey on pathogenic *Vibrios*, investigate the predation relation of BALO-*Vibrio* using microcosm studies, and determine the efficacy of BALOs in preventing larval mortality at Triple N Oyster Farm and the oyster research laboratory. It is asserted that BALOs act as probiotics and are safe in use in clinical trials, i.e., that they are not pathogens for humans. However, questions remain, e.g., what level of BALO would be necessary for utility and would it be easy to achieve such a level in aquaculture? The proposed research takes the first step in probiotic bacterial approaches and, if feasible at a commercial scale, is a very interesting. Potentially the project is of real value to the Louisiana economy. Industry partner Triple N Oyster Farm, LLC pledges in-kind support (parent oysters and oyster larvae) valued at $11,000 over the three-year period. The panel notes that the Triple N Oyster Farm letter of support was not submitted on the company's letterhead and did not include its physical address or contact information. As a condition of funding, Triple N Oyster Farm, LLC's letter of support must be revised and resubmitted. The overall budget appears acceptable. It is recommended that the project be funded at the level requested, i.e., $84,321 for year one, $73,514 for year two, and $73,514 for year three. The PI is required to maintain support for graduate research assistants (GRAs) and undergraduate students at the level proposed in the original budget for each year of the project.

As a condition of funding, the types and amounts of the institutional and external matching commitments as stated in the proposal should be maintained <u>in full</u>. Funding is contingent upon receipt by the Board no later than June 30, 2021 of updated documentation showing support at the levels indicated in the original proposal and as required in Appendix C.1.

BUDGET	BoRSF	EXTERNAL
1st Year	$84,321	$4,400 as specified in the proposal
2nd Year	$73,514	$4,400 as specified in the proposal
3rd Year	$73,514	$2,200 as specified in the proposal

Appendix C.2 (continued)

Proposal 011B **Rank: 6**

TITLE: *Fighting Fire With Innovation: Applying Advanced Manufacturing Techniques to Transform Louisiana-Based Commodity Chemicals Into High-Value Flame Retardant Products*

INSTITUTION: Louisiana State University and A&M College

PRINCIPAL INVESTIGATOR: John Pojman, Ph.D.

COMMENTS: The goal of this research is to create new melamine-based resins that can be formed by digital light 3D printing, exhibit flame retardancy, and exhibit shape memory. As a market application, the resins to be created aim to expand the use of melamine, which is exclusively manufactured in Louisiana by Cornerstone Chemical Company. As a science and research application, the project requires broad analytical expertise and improved understanding of fundamental chemical structure and function imparting flame retardancy; explores the use of 3D and digital light printing as an enabling technology for the chemical industry; and enhances shape memory development.

The proposed research combines expertise from Louisiana State University and A&M College (LSU) Departments of Chemistry and Mechanical Engineering and will leverage the NSF EPSCoR Louisiana Materials Design Alliance (LAMDA) project, which focuses on 3D printing. The investigators propose to synthesize and print with digital light 3D printers novel melamine-based resins with and without shape memory capabilities and characterize the mechanical and thermal properties and, importantly, the flame resistance (fire retardancy) of the printed resin parts. The goal of this approach is to develop novel monomers for 3D printing and impart characteristics like fire retardancy into their structure, enabling new commercial applications for melamine. Although the scope of the work is large, most of the mechanisms are in place to achieve success. Melamine is produced in large quantities by Cornerstone Chemical Co., based in Waggaman, LA. By jointly advancing manufacturing techniques and resin with melamine, the industry-university partnership accelerates product development, builds unique in-state expertise, and impacts Louisiana by positioning the state to be an innovator in applying chemistry to develop safer, more flame-retardant materials. Cornerstone Chemicals, Co. pledges support of up to $146,280 or $48,760 per year, contingent upon LSU and Cornerstone concluding their IP and project alignment/expectations agreement. Therefore, prior to funding the LSU and Cornerstone Chemicals, Co. agreements must be concluded, and a revised letter of support submitted. The overall budget is acceptable, less supplies, which appear inflated. It is recommended that the proposed budget be revised to limit supplies costs to $20,000, resulting in a year one budget of $109,820. Budgets of $96,270 are recommended for year two and year three. The PI is required to maintain support for two graduate research assistants (GRAs) at the level proposed in the original budget for each year of the project.

As a condition of funding, the types and amounts of the institutional and external matching commitments as stated in the proposal should be maintained <u>in full</u>. Funding is contingent upon receipt by the Board no later than June 30, 2021 of updated documentation showing support at the levels indicated in the original proposal and as required in Appendix C.1.

BUDGET	BoRSF	EXTERNAL
1st Year	$109,820	$48,760 as specified in the proposal
2nd Year	$96,270	$48,760 as specified in the proposal
3rd Year	$96,270	$48,760 as specified in the proposal

Appendix C.2 (continued)

Proposal 017B **Rank: 7**

TITLE: *Electrochemical Control of Fatigue Cracks*

INSTITUTION: Louisiana Tech University

PRINCIPAL INVESTIGATOR: Henry Cardenas, Ph.D.

COMMENTS: The effort to mitigate metal fatigue generally involves control of stress, scheduling of defect inspections, estimating when a given crack will start growing, and determining when it will grow to a dangerous length. These tasks are hindered by small cracks, which tend to be difficult and costly to detect. Many crack-prone areas are relatively inaccessible. Recent work has demonstrated that an electroplating process can be used to stop remotely the growth of pipeline cracks, even those that are too small to be detected by borescope cameras. This approach would not change inspection frequency but would significantly reduce the number of repairs required. In addition, an analytical model was developed that effectively predicted how long a treated crack would remain arrested.

The proposed research represents collaboration between Louisiana Tech University (LA Tech), the Louisiana Product Development Team, LLC, and American Electric Power (AEP) to develop an *in situ* industrial plating process for pipelines and pressure vessels, to ease maintenance procedures. The goal is to arrest corrosion, a difficult problem since the defects need to be cleaned first. The concept is not new, but the idea of putting such coatings on inner surfaces of boilers is innovative. This approach will be especially valuable for industries that are dealing with crack-prone areas, which are difficult and costly to access for camera inspection and repair, in their processes. Access to the site using the flexible probe must be achieved and the area of corrosion must be detected, although this may not be a problem with standard boiler tubes. Assuming that the electrochemical treatment stops propagation, the question remains: would you trust the approach in critical situations? The Louisiana-based partners will develop three styles of prototype treatment delivery systems that will be deployed in pilot trials conducted within boiler tubes at AEP and other industrial applications. In general, the savings that could be attained due to success of the work appear overestimated. One of the more interesting aspects of the proposal is the design of the Capstone program to facilitate oversight of the project by faculty and industry sponsors. This work will be supported by cash and in-kind contributions from the Louisiana Product Development Team, LLC ($3,000 cash and $4,000 in-kind) and American Electric Power ($2,000-$3,000/year). Prior to funding, the industry partners' letters of support should be revised to clearly state the actual funding committed for each year of the project. The overall budget is acceptable, less travel, which appears inflated. It is recommended that the proposed budget be revised to limit travel costs to $2,000, resulting in an annual budget of $83,069 for year one and year two. A budget of $82,069 is recommended for year three. The panel noted that the institution did not provide a tuition waiver for the GRAs supported by the project. The institution should reconsider this omission, as GRA support should include not only wages, but tuition support as well. The PI is required to maintain support for graduate research assistant (GRAs) at the level proposed in the original budget for each year of the project.

As a condition of funding, the types and amounts of the institutional and external matching commitments as stated in the proposal should be maintained <u>in full</u>. Funding is contingent upon receipt by the Board no later than June 30, 2021 of updated documentation showing support at the levels indicated in the original proposal and as required in Appendix C.1.

BUDGET	BoRSF	EXTERNAL
1st Year	$83,069	$8,800 as specified in the proposal
2nd Year	$83,069	$8,000 as specified in the proposal
3rd Year	$82,069	$10,000 as specified in the proposal

Appendix C.2 (continued)

Proposal 025B **Rank: 8**

TITLE: *Adsorptive Removal of Lead [Pb] from Water and Wastewater Using Functionalized Adsorbent*

INSTITUTION: University of Louisiana at Lafayette

PRINCIPAL INVESTIGATOR: Daniel Gang, Ph.D.

COMMENTS: Lead (Pb) has been listed as one of the most pernicious contaminants due to its bioaccumulation and non-biodegradability. During the Flint, Michigan water crisis in 2014, over 100,000 residents were exposed to Pb levels of concern in their drinking water. The USEPA and US-CDC partnered in 2016 to aggressively target Pb for elimination from human consumption, making Pb removal a continuing water industry priority. The maximum contaminated level (MCL) of Pb in drinking water set by the USEPA is 0.015 mg/L.

The proposed ITRS research project represents collaboration between the University of Louisiana at Lafayette (ULL) and industry partners H_2O LLC (Lafayette, LA), Domingue SZABO & Associates, Inc. (Lafayette, LA) and Noble Plastics (Grand Coteau, LA). The project will utilize a ULL-patented functionalized adsorbent to remove PB from water and wastewater. The novel adsorbent is based on a new class of materials that the PIs have been investigating and for which they have filed patents. The functionalized adsorbent has 10 times higher adsorption capacity for Pb removal compared with commercial anionic resins and granular activated carbon (GAC). The research project will focus on design optimization, cost analysis, and technology transfer. The real problem is leaching from antique lead pipes. There are questions not yet answered, e.g., how much demand is there for removal at the source (as in industry); and for smaller units (possibly in households) where does the lead end up? When the proposal is viewed broadly, it is unlikely there would be much utility in the approach. This research will not compete with Britta for the home market. Industry partner Dominque, Szabo & Associates pledges in-kind support of $10,000/year, Noble Plastics $5,000/year in-kind (labor and design/manufacturing assessments), and H_2O, LLC $10,000/year in-kind. The H_2O, LLC letter of support did not include its physical address on the company's letterhead. Noble Plastics' letter of support did not include the signature of the company's president. Therefore, the letters of support must be revised and resubmitted to include the required information. The overall budget is acceptable, less travel and supplies, which appear inflated. It is recommended that the proposed budget be revised to limit travel costs to $2,000 and supplies charges to $5,000, resulting in a budget of $100,644 for year one. Annual budgets of $97,035 are recommended for year two and year three, which limit supplies costs to $3,000 per year. The PI is required to maintain support for graduate research assistants (GRAs) at the level proposed in the original budget for each year of the project.

As a condition of funding, the types and amounts of the institutional and external matching commitments as stated in the proposal should be maintained <u>in full</u>. Funding is contingent upon receipt by the Board no later than June 30, 2021 of updated documentation showing support at the levels indicated in the original proposal and as required in Appendix C.1.

BUDGET	BoRSF	EXTERNAL
1st Year	$100,644	$25,000 as specified in the proposal
2nd Year	$97,035	$25,000 as specified in the proposal
3rd Year	$97,035	$25,000 as specified in the proposal

APPENDIX C.3
COMMENTS ON PROPOSALS RANKED PRIORITY I BY THE SUBJECT-AREA PANEL AND CONSIDERED BY THE FINAL PANEL BUT NOT RECOMMENDED FOR FUNDING

Proposal 010B

TITLE: *Participatory Sensing and City-Scale Digital Twin for Disaster Resilient Communities and Cities*

INSTITUTION: Louisiana State University and A&M College

PRINCIPAL INVESTIGATOR: Yong-Cheol Lee, Ph.D.

COMMENTS: The goal of the proposed research is to improve disaster response capabilities and long-term resilience of disaster-vulnerable communities by developing participatory sensing methods and digital twin-based disaster data analysis and sharing systems. Three innovations are depicted: participatory sensing, AI-based analysis, and digital twin sharing. The proposal provides no reason to believe that the stated objectives will really improve disaster response. At its core, disaster response depends on intercommunication. The proposed solutions, if anything, may make response harder by increasing data flow for no well-defined purpose. There is little novelty demonstrated in the sensor area, in which the investigators propose to develop apps. Developing apps will not get the public to use them—this is the participatory part. There is little to suggest widespread application of the results of this work.

Proposal 014B

TITLE: *Developing a Holistic Structural Health Monitoring System for Offshore Wind Farms*

INSTITUTION: Louisiana State University and A&M College

PRINCIPAL INVESTIGATOR: Chao Sun, Ph.D.

COMMENTS: Offshore wind energy is becoming increasingly attractive because of environmental issues. However, due to severe marine conditions, such as strong winds, waves, earthquakes, thunderstorms and corrosion, offshore wind turbines (OWTs) suffer from various types of damages during service life, which impair their power output and structural safety, and increase the production cost. The goal of this proposal is to develop a holistic structural health monitoring system to provide exact early warnings of damage and guidance for optimized operation and maintenance of offshore wind farms. The proposed work is a barrage of ideas, each of which could be a research agenda. Because non-catastrophic damage occurs over time, testing of the proposed model is called into question. There are questions yet to be answered, e.g., what is currently known about time-dependent (non-catastrophic) failure modes; do manufacturers have stated maintenance programs for the turbines; and does the expense of monitoring outweigh the cost of failure? The role of drones in the proposed research is unclear.

Appendix C.3 (continued)

Proposal 018B

TITLE: *High-Performance Composite Electrodes for Lithium Batteries*

INSTITUTION: Louisiana Tech University

PRINCIPAL INVESTIGATOR: Shengnian Wang, Ph.D.

COMMENTS: The goal of the proposed research is to develop a scalable manufacturing process for silicon-rich anodes. This is an ambitious proposal. Silicon is one of the most promising electrode materials for high-capacity lithium-ion batteries. However, a few technical barriers prevent it from being fully commercially viable. The project will address these barriers by developing a scalable manufacturing process for silicon-rich composite anodes with high reversible capacity and excellent cycling stability. For anodes with 20-40% silicon, Si nanoparticles will be encapsulated within mesovoids in composite nanofibers through a combination of foaming and nanofiber production processes. This is said to minimize silicon electrolyte contact, allowing for expansion of Si after alloying with lithium. Some realistic preliminary data should have been presented, as the proposal couples a number of complex and difficult manufacturing techniques. Industry partner Advano pledges in-kind support (in-house battery testing) of $30,000-$40,000 per year. The transfer of the work to the private sector is solely through industry partner Advano; intellectual property could be an issue. Advano appears well positioned in the li-ion sector, so this support is very valuable. The question becomes, who will benefit from the results? The PI has not worked in this area recently, but the team is well qualified to conduct the proposed research.

Proposal 019B

TITLE: *Continuous In-situ Acrolein Production for Sulfide Treatment in Oil-field Waters*

INSTITUTION: McNeese State University

PRINCIPAL INVESTIGATOR: Srinivasan Ambatipati, Ph.D.

COMMENTS: One of the best treatment chemicals is Acrolein, due to its unique properties to overcome the sulfides in oil field waters. Legacy treatments include delivering 99% pure Acrolein in cylinders and further diluting it to less than 1% before injecting into the pipeline. The extremely hazardous nature of Acrolein amplifies the risk to transport on roadways and presents a major exposure hazard to personnel in the field handling high concentrations of Acrolein, thus limiting the use of Acrolein treatment in the oil and gas industry. The project research proposes to generate this hazardous chemical (Acrolein) in-situ from zeolite-based catalysts and glycerol, for the purpose of sulfide remediation. The research study will focus on a modular-scale concept to produce dilute Acrolein from renewable glycerol in-situ using a low-cost catalyst system and a regeneration method, to justify the economics of sulfide treatment in oil field waters. It is the panel's position that, without any preliminary evidence, this is research based on a faith that it will work. Research funds might be better used to find a substitute for Acrolein (possibly bioremediation using sulfur catabolizing bacteria). A real HAZMAT situation could occur during the proposed work. While a significant case is made for the need of the treatment of sulfides, there were almost no quantifiable data given for the economic justification. This should be addressed. Some preliminary data should also be provided to justify potential success, particularly as the PI and Chief Science Officer and Managing Member of Chem Advances, LLC have worked together on this before. Chem Advances, LLC provides a cash match of $30,000. The proposed budget should be reviewed, as the year two budget is much higher than year one and inconsistent with the RFP requirements. The proposal team has some experience in the research area and clearly described the need for an in-situ manufacturing method. The PI has related patents, but no relevant publications.

Appendix C.3 (continued)

Proposal 022B

TITLE: *Development and Commercialization of Novel Green Adhesives Produced from Wastewater Sludges With and Without Soy Protein Supplementation Based on the Use of Whole Non-Extracted Sludges and/or Extracted Sludge Raw Proteins*

INSTITUTION: University of Louisiana at Lafayette

PRINCIPAL INVESTIGATOR: William Chirdon, Ph.D.

COMMENTS: The goal of the proposed work is to develop profitable and well-performing adhesives for entrance into the growing protein-based adhesive market. This proposal or a similar proposal dealing with production of composite materials from bioprocessing wastes has been submitted to the ITRS in previous years. Targeted adhesives feedstocks for this project are either a mixture of soybean and biosolids proteins or proteins from biosolids. The source of the biosolids is the digestion of primary and waste-activated sludges within anaerobic and/or aerobic digesters at wastewater treatment plants (WWTPs). Aside from variability of the biosolids, there is no guarantee that harmful metals, potentially radioactives and other toxic materials, will not be entrained in the process. There are questions to be answered, e.g., would consumers want to use in their homes a product derived from sewerage, even if it were guaranteed as safe; and, when looking at the strength of typical wood glues, the value of greater than 3000 psi is standard, but the proposed adhesives in this work will have 200 psi strength, so how will this be able to compete? This is a very well written proposal which does make a strong argument. The proposed work on protein denaturation has limited applicability outside of this sphere. The proposed tasks are sequentially dependent, which means if early work fails, all fails behind it; no plan is given to adjust for such an outcome. The PI has a very diffuse research record. External support is provided by a group of companies (not clearly related) with one wood company (Etex Fiber Supply, LLC) providing annual cash support of $5,000.

APPENDIX C.4
GENERAL STATEMENT ON MERITORIOUS PROPOSALS NOT RECOMMENDED FOR FUNDING AT THIS TIME (PRIORITY TWO)

The proposals included in this category are believed to be meritorious, although of a lower order than those rated Priority One. Individual subject-area commentaries on the proposals ranked Priority Two are not included in this report. The proposals so ranked are not recommended for funding.

Proposal 002B

TITLE: *Advanced Hurricane Testing of Critical Infrastructure to Protect the People and Businesses along the Coast*

INSTITUTION: Louisiana State University and A&M College

PRINCIPAL INVESTIGATOR: Aly Mousaad Aly, Ph.D.

COMMENTS: Dr. Aly has submitted this proposal or a very similar proposal to the ITRS in previous years. The project is very ambitious and must accomplish many objectives in order to have any probability of success. There was no mention that cost analysis, combined with potential changes in codes or regulations, would encourage adoption of this technology across the southeastern U.S. Industry partner Solar Alternatives pledges $30,000 in cash and in-kind support for the three-year project, while Metal Building Manufacturing Association (MBMA) pledges $5,000 per year of in-kind consulting support. The PI has a good but aging publication record and no recent grants. The PI requests approximately $185,000 of support from the Board of Regents. The PI received previous ITRS funding on a similar topic, which ended in 2019. This proposal has not significantly improved from previous submissions.

Proposal 005B

TITLE: *Development of a Real-Time Data Assimilation Framework for Intelligent Managed Pressure Drilling*

INSTITUTION: Louisiana State University and A&M College

PRINCIPAL INVESTIGATOR: Yuanhang Chen, Ph.D.

COMMENTS: The research proposes to develop a physics-based, data-driven system to estimate pressure during various drilling stages, essentially taking a control estimation strategy and applying it to this problem. The heart of this model is the statistical evaluation of the real-time data using the non-linear unscented Kalman technique. With comparison of only two sets of measured data, it is difficult to see how any general applicability or increase in safety and prediction of kicks or blowouts could be determined. The proposal identifies a list of potential large company end users but provides no letters of support. The companies seek to form a consortium. This is a great idea, but not the business of the ITRS. If a consortium is formed, its tangible backing of this proposal would make it much more competitive. In general, the proposal was not well written. The research tasks appear the same with different data sets. The PI has current BoR support.

Appendix C.4 (continued)

Proposal 008B

TITLE: *Increasing the Efficacy of Coastal Restoration Projects Using Adaptive Management*

INSTITUTION: Louisiana State University and A&M College

PRINCIPAL INVESTIGATOR: Navid Jafari, Ph.D.

COMMENTS: The overall goal of the proposal is to conduct field monitoring and numerical analysis ultimately to enable partnering agencies and stakeholders to more effectively create, enhance, and/or restore coastal marshes. This would reduce the risk of coastal flooding and erosion, support navigation of waterways, provide environmental and ecosystem benefits, and boost economic development in fisheries, in part by developing a CPRA design guide. Is there currently no oversight of the $22.5 billion provided for wetland restoration work? The proposed work would use a case study to assess the monitoring strategy. The year one research plan looks at two projects, but it is unclear how these translate to the entire region. The work implies that soil porosity is critical to monitor, so why not focus efforts in this area? The proposal does not make a compelling argument for the specified research outcome. There is cash and in-kind support from an engineering firm totaling $17,900 per year, demonstrating real industrial interest. The proposal does not appear innovative and is very limited in scope.

APPENDIX C.5
GENERAL STATEMENT ON PROPOSALS RANKED
PRIORITY THREE BY THE FINAL PANEL

Individual commentaries on proposals ranked Priority Three by the final panel are not included in this report. Proposals so ranked were not recommended for funding for at least two of the following reasons (not listed in order of importance):

- Insufficient or inappropriate industrial matching funds were pledged and/or external support documented in the proposal budget was not substantiated by required letters of industrial support
- The industrial partner'(s) role in the research collaboration was not provided and/or detailed in the proposal
- The proposal did not have clear objectives and/or research plans lacked scientific rigor or completeness
- The background of the principal investigator was inconsistent with the proposed research and/or the principal investigator had an unusually poor publication record in the proposed area of research
- The proposal showed little or no potential for contributing to the near-term development and diversification of Louisiana's economy
- The proposal did not contain evidence of future commercialization, or it was not clear what economic benefit would be gained from the research
- Budgets were excessive, inadequately justified, or inconsistent with provided budget justifications
- The need for consultants and/or subcontracts was not adequately justified
- Equipment requests were excessive and/or inappropriate for the research proposed

APPENDIX D
LIST OF SUBJECT-AREA REVIEWERS WHO PARTICIPATED
IN PHASES I & II OF THE REVIEW PROCESS

Life Sciences and Bioengineering I

Dr. Brian Scott Baldwin, Chair
Department of Plant and Soil Sciences
Mississippi State University

Dr. Sangamesh Angadi
Department of Plant and Environmental Sciences
New Mexico State University

Clean Technology and Energy

Dr. Russell D. Ostermann, Chair
Department of Chemical & Petroleum Engineering
University of Kansas

Dr. Roger A. Korus
Department of Chemical Engineering
University of Idaho

Advanced Materials and Manufacturing

Dr. Mathew Schaefer, Chair
Department of Mechanical and Industrial Engineering
Milwaukee School of Engineering

Dr. Matthew J. Traum
Chief Executive Officer, Engineer Inc.

Coastal and Water Management

Dr. Trevor H. Boyer, Chair
Department of Environmental Engineering Sciences
Arizona State University

Dr. James T. Anderson
Environmental Research Center
West Virginia University

APPENDIX E

SUMMARY OF PROPOSALS SUBMITTED TO THE INDUSTRIAL TIES RESEARCH SUBPROGRAM (ITRS) FY 2020-21

Proposals Submitted to the Research and Development Program - Industrial Ties Research Subprogram (ITRS)
FY 2020-21 Review Cycle

Proposal #	PI Name	Category	Institution	Project Title	Amount Requested			
					Year 1	Year 2	Year 3	Total
001B-21	Dr. Subramaniam Sathivel	Advanced Materials and Manufacturing	Louisiana State University Agricultural Center	Producing a Food-grade Biodegradable Drinking Straw	$76,938.00	$72,938.00	$55,823.00	$205,699.00
002B-21	Prof. Aly Mousaad Aly	Coastal and Water Management	Louisiana State University and A & M College	Advanced Hurricane Testing of Critical Infrastructure to Protect the People and Businesses along the Coast	$74,736.00	$60,085.00	$49,931.00	$184,752.00
003B-21	Prof. Christopher Arges	Advanced Materials and Manufacturing	Louisiana State University and A & M College	High-Temperature Polymer Electrolyte Membrane (HT-PEM) Pumps for Clean Hydrogen Extracted from Hydrocarbon Mixtures	$69,575.00	$67,275.00	$65,975.00	$202,825.00
004B-21	Prof. Matthew Chambers	Clean Technology and Energy	Louisiana State University and A & M College	Cationic Carbonylation Catalyst Development for Safer and More Efficient Chemical Processes at Lower Pressures	$78,254.00	$75,254.00	$72,254.00	$225,762.00
005B-21	Dr. Yuanhang Chen	Clean Technology and Energy	Louisiana State University and A & M College	Development of a Real-time Data Assimilation Framework for Intelligent Managed Pressure Drilling	$84,100.00	$80,000.00	$76,400.00	$240,500.00
006B-21	Prof. Jin-Woo Choi	Coastal and Water Management	Louisiana State University and A & M College	Autonomous Water Quality Monitoring System	$82,250.00	$78,000.00	$76,875.00	$237,125.00
007B-21	Prof. Aixin Hou	Life Sciences and Bioengineering	Louisiana State University and A & M College	Prevention and control: curtailing pathogenic Vibrio spp. with probiotics in Louisiana oyster hatcheries	$84,321.00	$73,514.00	$73,514.00	$231,349.00
008B-21	Prof. Navid Jafari	Coastal and Water Management	Louisiana State University and A & M College	Increasing the Efficacy of Coastal Restoration Projects using Adaptive Management	$52,290.00	$46,290.00	$46,290.00	$144,870.00
009B-21	Prof. Chris Kees	Coastal and Water Management	Louisiana State University and A & M College	Hybrid physical/digital coastal engineering wave tank	$113,499.00	$103,499.00	$93,499.00	$310,497.00
010B-21	Dr. YONG-CHEOL LEE	Coastal and Water Management	Louisiana State University and A & M College	Participatory Sensing and City-Scale Digital Twin for Disaster Resilient Communities and Cities	$130,946.00	$94,430.00	$90,930.00	$316,306.00
011B-21	Prof. John Pojman	Advanced Materials and Manufacturing	Louisiana State University and A & M College	Fighting Fire With Innovation: Applying advanced manufacturing techniques to transform Louisiana-based commodity chemicals into high-value flame retardant products	$119,820.00	$99,770.00	$99,770.00	$319,360.00
012B-21	Dr. Dandina Rao	Clean Technology and Energy	Louisiana State University and A & M College	Development of Alkali-Surfactant-Polymer Formulations for Optimizing Oil Production from Louisiana Carbonate Reservoirs	$93,781.00	$92,781.00	$0.00	$186,562.00
013B-21	Dr. Jyotsna Sharma	Clean Technology and Energy	Louisiana State University and A & M College	Application of Distributed Fiber Optic Sensing for Sand Detection in Offshore Production	$88,351.00	$86,393.00	$78,851.00	$253,595.00
014B-21	Dr. Chao Sun	Clean Technology and Energy	Louisiana State University and A & M College	Developing a holistic structural health monitoring system for offshore wind farms	$70,501.00	$70,371.00	$70,159.00	$211,031.00
015B-21	Dr. Mehdi Zeidouni	Clean Technology and Energy	Louisiana State University and A & M College	Enabling Net-Zero Carbon Petrochemicals in the Louisiana Chemical Corridor through Carbon Capture and Storage	$83,214.00	$77,464.00	$0.00	$160,678.00
016B-21	Dr. Shaurav Alam	Advanced Materials and Manufacturing	Louisiana Tech University	Elucidating Composition-Process-Microstructure-Property Relationships for Manufacturing Sustainable Structural Components with Landfill Bound Plastics	$66,000.00	$62,000.00	$58,000.00	$186,000.00
017B-21	Dr. Henry Cardenas	Advanced Materials and Manufacturing	Louisiana Tech University	Electrochemical Control of Fatigue Cracks	$83,569.00	$83,569.00	$82,569.00	$249,707.00
018B-21	Prof. Shengnian Wang	Advanced Materials and Manufacturing	Louisiana Tech University	High-performance Composite Electrodes for Lithium Batteries	$60,000.00	$60,000.00	$60,000.00	$180,000.00
019B-21	Dr. Srinivasan Ambatipati	Clean Technology and Energy	McNeese State University	Continuous In-situ Acrolein Production for Sulfide Treatment in Oil-field Waters	$68,416.00	$86,510.00	$57,285.00	$212,211.00

Proposals Submitted to the Research and Development Program - Industrial Ties Research Subprogram (ITRS)
FY 2020-21 Review Cycle

Proposal #	PI Name	Category	Institution	Project Title	Amount Requested			
					Year 1	Year 2	Year 3	Total
020B-21	Dr. Balaji Ramachandran	Life Sciences and Bioengineering	Nicholls State University	A New Methodology for Estimating Sugarcane Yields Prior to Harvest using Unmanned Aerial Systems [UAS]	$63,321.00	$63,321.00	$44,804.00	$171,446.00
021B-21	Prof. Vijay John	Coastal and Water Management	Tulane University	A New Technology to Ameliorate Harmful Algal Blooms	$89,944.00	$89,944.00	$89,944.00	$269,832.00
022B-21	Dr. William Chirdon	Clean Technology and Energy	University of Louisiana at Lafayette	Development and Commercialization of Novel Green Adhesives Produced from Wastewater Sludges With and Without Soy Protein Supplementation Based on the Use of Whole Non-Extracted Sludges and/or Extracted Sludge Raw Proteins	$120,559.00	$98,749.00	$98,186.00	$317,494.00
023B-21	Dr. Ling Fei	Advanced Materials and Manufacturing	University of Louisiana at Lafayette	From Biowaste to Energy Storage: Chitosan Based Gel/Solid Electrolyte for Lithium Ion Batteries	$54,238.00	$53,488.00	$52,738.00	$160,464.00
024B-21	Dr. Farzad Ferdowsi	Clean Technology and Energy	University of Louisiana at Lafayette	Secure and Efficient Power Delivery and Management in Modern Electric Power Grids	$64,214.00	$63,591.00	$59,992.00	$187,797.00
025B-21	Dr. Daniel Gang	Coastal and Water Management	University of Louisiana at Lafayette	Adsorptive Removal of Lead [Pb] from Water and Wastewater Using Functionalized Adsorbent	$107,054.00	$99,945.00	$97,928.00	$304,927.00
026B-21	Dr. Ning Liu	Clean Technology and Energy	University of Louisiana at Lafayette	Nanoparticle-stabilized CO2 Foam for CO2 Enhanced Oil Recovery Under Reservoir Conditions	$84,406.00	$81,259.00	$78,689.00	$244,354.00
027B-21	Dr. Mohammad Madani	Clean Technology and Energy	University of Louisiana at Lafayette	A Novel Cascaded Dual-Rotor Wind Turbine	$86,628.00	$77,394.00	$67,332.00	$231,354.00
028B-21	Dr. Md Hoque	Advanced Materials and Manufacturing	University of New Orleans	Anomaly and Defect Detection in Additive Manufacturing Processes	$70,948.00	$73,578.00	$75,793.00	$220,319.00
029B-21	Dr. Brandon Taravella	Advanced Materials and Manufacturing	University of New Orleans	All-Electric Boat for Recreational and Commercial Use in Coastal Louisiana	$83,829.00	$98,136.00	$99,856.00	$281,821.00

Total Number of Proposals Submitted	29
Total Funds Requested for First Year	$2,405,702.00
Total Funds Requested for Second Year	$2,269,548.00
Total Funds Requested for Third Year	$1,973,387.00
Total Funds Requested	$6,648,637.00