STATE OF CALIFORNIA
GRANT REQUEST FORM (GRF)
CEC-270 (Revised 12/2019) CALIFORNIA ENERGY COMMISSION

A) New Agreement # EPC-20-015 (to be completed by CGL office)

B) Division	Agreement Manager:	MS-	Phone
ERDD	Eleanor Oliver	51	916-445-5377

C) Recipient's Legal Name	Federal ID Number
Sepion Technologies, Inc.	47-4950211

D) Title of Project
Hybrid Lithium-Metal Batteries for Low-Cost and Long-Range Electric Vehicles

E) Term and Amount

Start Date	End Date	Amount
4/1/2021	3/31/2024	$ 1,400,000

F) Business Meeting Information

☐ ARFVTP agreements $75K and under delegated to Executive Director

Proposed Business Meeting Date 3/17/2021 ☐ Consent ☒ Discussion

Business Meeting Presenter Michael Ferreira Time Needed: 5 minutes

Please select one list serve. EPIC (Electric Program Investment Charge)

Agenda Item Subject and Description:
SEPION TECHNOLOGIES, INC. Proposed resolution approving agreement EPC-20-015 with Sepion Technologies, Inc. for a $1,400,000 grant to advance the development of safe "anode-free" hybrid lithium-metal cells from a lab-scale validation to a pre-prototype and adopting staff's determination that this action is exempt from CEQA. This project will enhance two key components, the electrolyte and an "anode-free" current collector. The optimized components will maximize cycle life, fast-charging capability and safety of the cell, while the unique cell design will eliminate a layer of complexity in the commercialization process to enable a competitive price point. (EPIC funding) Contact: Michael Ferreira.

G) California Environmental Quality Act (CEQA) Compliance

1. Is Agreement considered a "Project" under CEQA?
   ☒ Yes (skip to question 2)
   ☐ No (complete the following (PRC 21065 and 14 CCR 15378)):

   Explain why Agreement is not considered a "Project":

2. If Agreement is considered a "Project" under CEQA:
   a) ☒ Agreement **IS** exempt.
   ☐ Statutory Exemption. List PRC and/or CCR section number:
   ☒ Categorical Exemption. List CCR section number: Cal. Code Regs., tit. 14, § 15301
   ☒ Common Sense Exemption. 14 CCR 15061 (b) (3)

   Explain reason why Agreement is exempt under the above section: The project is exempt under Cal. Code Regs., tit. 14, § 15301 because proposed project

activities consist of a paper study, laboratory work, modeling, design, testing, and other activities that consist of the operation and minor alteration of existing research and laboratory facilities and existing mechanical equipment already occupied and utilized by the project team and will involve negligible or no expansion of existing or former use. These activities will occur at two existing research and laboratory facilities.
The project is exempt under Cal. Code Regs., tit. 14, § 15061(b)(3)) because proposed activities are covered by the general rule that CEQA applies only to projects which have the potential for causing a significant effect on the environment. Where it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment, the activity is not subject to CEQA. Here, project activities will consist of ongoing research and laboratory work in existing facilities that will have no potential to cause a significant effect on the environment.

b) Agreement **IS NOT** exempt. (consult with the legal office to determine next steps)

Check all that apply

- ☐ Initial Study
- ☐ Negative Declaration
- ☐ Mitigated Negative Declaration
- ☐ Environmental Impact Report
- ☐ Statement of Overriding Considerations

H) List all subcontractors (major and minor) and equipment vendors: (attach additional sheets as necessary)

Legal Company Name:	**Budget**
Randolph W. Chan	$ 30,000
Ed Williams	$ 20,000
Aionics, Inc.	$ 0
Carnegie Mellon University	$ 0
To Be Determined	$ 0

I) List all key partners: (attach additional sheets as necessary)

Legal Company Name:

J) Budget Information

Funding Source	**Funding Year of Appropriation**	**Budget List Number**	**Amount**
EPIC	19-20	301.001G	$1,400,000

R&D Program Area: EDMFO: EDMF TOTAL: $ 1,400,000

Explanation for “Other” selection

Reimbursement Contract #: Federal Agreement #:

K) Recipient's Contact Information

1. Recipient's Administrator/Officer

Name: Kaitlin(Katie) O'Day
Address: 1198 65th St. Suite 170
City, State, Zip: Oakland, CA 94612-1885
Phone: 510-244-1215
E-Mail: katie@sepiontechnologies.com

2. Recipient's Project Manager

Name: Peter Frischmann
Address: 1198 65th St. Suite 170
City, State, Zip: Oakland, CA 94612-1885
Phone: 208-406-9888
E-Mail: pete@sepiontechnologies.com

L) Selection Process Used

☒ Competitive Solicitation Solicitation #: GFO-20-301
☐ First Come First Served Solicitation Solicitation #:

M) The following items should be attached to this GRF

1.	Exhibit A, Scope of Work		☒ Attached
2.	Exhibit B, Budget Detail		☒ Attached
3.	CEC 105, Questionnaire for Identifying Conflicts		☒ Attached
4.	Recipient Resolution	☒ N/A	☐ Attached
5.	CEQA Documentation	☐ N/A	☒ Attached

Eleanor Oliver — **Agreement Manager**
2/5/2021 — **Date**

Erik Stokes — **Office Manager**
2/5/2021 — **Date**

Linda Spiegel — **Deputy Director**
2/5/2021 — **Date**

Exhibit A
Scope of Work
Sepion Technologies, Inc.

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2		Data-Driven Electrolyte Optimization
3	X	"Anode-Free" Current Collector Testing and Validation
4		Cell Validation, Safety Testing, and Market Facilitation Activities
5		Evaluation of Project Benefits
6		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CEC	California Energy Commission
CPR	Critical Project Review
TAC	Technical Advisory Committee
EV	Electric Vehicle
ZEV	Zero Emission Vehicle
LESA	Lithium-Electrode Sub-Assembly
ARPA-E	Advanced Research Project Agency - Energy
GHG	Greenhouse Gas
R&D	Research and Development
TRL	Technology Readiness Level
ML	Machine Learning
DOE	Design of Experiments
NMC	Nickel Manganese Cobalt Oxide
ROI	Return on Investment
Ah	Amp hour

II. PURPOSE OF AGREEMENT, PROBLEM/SOLUTION STATEMENT, AND GOALS AND OBJECTIVES

A. Purpose of Agreement

The purpose of this Agreement is to fund the rapid optimization of energy-dense, safe, and easily manufacturable lithium-metal battery cells that enable low-cost and long-range electric vehicles.

[1] Please see subtask 1.3 in Part III of the Scope of Work (General Project Tasks) for a description of Critical Project Review (CPR) Meetings.

Exhibit A
Scope of Work
Sepion Technologies, Inc.

This project will marry the Recipient's extensive lithium-metal battery membrane portfolio with design of experiments and data-driven approaches to optimize two key components, the electrolyte and an "anode-free" current collector, resulting in a lithium-metal full-cell product designed to accelerate deployment of next-gen electric vehicles for California rate payers in support of zero emission vehicle (ZEV) and renewable energy goals.

B. Problem/ Solution Statement

Problem

Currently, 85% of all lithium-batteries are made in Asia and supply chains are dominated by Asian interests. Support for local innovation and manufacturing of advanced batteries and their components is essential to de-risk supply chains and address cost/performance barriers on the path to realizing California's forward-thinking goals of reaching 100% renewable energy (SB-100) and 100% ZEV sales (N-79-20). To overcome incumbency advantages, innovation in next-gen battery technologies is crucial to leapfrogging global competition.

Li-ion batteries are reaching performance and cost plateaus fundamentally constrained by the materials used as electrodes to store energy. Rapid materials innovation is necessary to meet aggressive EV adoption forecasts by reducing costs and improving range. Replacing graphite anodes, which have remained essentially unchanged since Li-ion batteries were first commercialized in 1991, with pure metallic lithium anodes is a promising path to a 10-fold improvement in anode capacity and a 40% increase in cell energy density that will unlock step-changes in EV range and cost. Despite the promise of lithium-metal anodes, their commercialization has been unsuccessful per Recipient due to two key challenges: 1) lithium metal is known to form unwanted, one-dimensional dendritic and mossy growths during charging instead of preferable smooth, two-dimensional deposits resulting in electrical shorts that cause fires and accelerated electrolyte degradation that shortens cycle life; and 2) thin lithium metal anodes are notoriously difficult to manufacture at relevant dimensions and unit costs. Solid-state lithium-metal batteries with ceramic electrolytes have been proposed as the leading candidate to solve lithium-metal anode challenges. Despite their promise, defects inherent to ceramic electrolytes, the high cost of raw materials, novel manufacturing challenges, and poor rate capabilities dramatically limit their ability to compete on the cost-performance landscape of commercial EV batteries in the next ten years. Alternative solutions are needed to make lithium metal batteries a commercial reality on a timeline that aligns with California's clean energy goals.

Solution

With the support of the ARPA-E IONICS and CalSEED programs, the Recipient has developed a nano-porous polymer membrane that dramatically improves the performance of lithium metal anodes promising a 40% increase in EV range, a 20% reduction in cost, and improved safety. Importantly, the Recipients' current product, a lithium-electrode sub-assembly (LESA) consisting of the membrane and lithium metal anode, is designed to integrate with existing lithium-ion manufacturing infrastructure lowering the barrier to market adoption. This integration is accomplished with a hybrid lithium metal cell design where a solid lithium metal anode, protected by Recipient's membrane, is paired with a traditional metal oxide cathode and liquid electrolyte enabling an existing Gigafactory to become a 1.4-fold Gigafactory simply by switching to Recipient's LESA component and cell design. No retooling needed. These disruptive changes in battery performance and cost will drive consumer adoption of EVs in California, make access to

EVs more equitable, and boost available battery capacity essential to grid resiliency and penetration of renewable energy once two-way vehicle-to-grid infrastructure comes online.

To maximize the appeal of lithium metal cells built with Recipient's LESA for low-cost and long-range EV applications, this critical BRIDGE funding will support applied research and development (R&D) of two complimentary battery components, the electrolyte and current collector, that heavily influence the safety, cycle life, fast-charge capabilities, and cost of finished lithium-metal batteries. Anticipated synergies between Recipient's membrane and the optimized electrolyte will further differentiate hybrid lithium-metal cells coming out of this program and elevate the full cell design from technology readiness level (TRL) 4 to TRL 6. Speed and resource efficiency are essential to maximize impact of the proposed R&D; therefore, world-renowned battery and machine learning (ML) experts are committed partners de-risking this aggressive program. With the CEC's support, the Recipient will produce and validate prototype lithium-metal cells with leading automotive manufacturers supporting this project, laying the foundation for next-generation lithium battery manufacturing in California.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Accelerate commercialization of low-cost and energy-dense EV batteries, advancing Recipient's lithium-metal battery product from TRL 4 to 6, in support of California's clean energy goals including 100% EV sales by 2035 and 100% carbon-free electricity by 2045
- Build a production readiness plan that de-risks commercial scale up of low-cost and energy-dense lithium battery manufacturing in California

Ratepayer Benefits:[2]

This Agreement will result in the ratepayer benefit of relaxed range anxiety and reduced up-front cost of electric vehicles (EVs) while paving the way to greater electricity reliability, lower costs, and increased safety by accelerating a 100% decarbonized electricity grid. Electrified public transit and consumer owned plug-in EVs can be employed as grid-stabilizing agents connected by smart charging systems. This implementation of vehicle-to-grid controlled charging, both single- and bi-directional, can improve electricity grid efficiency by optimizing charging times to level out peak ramping and reduce the need for more conventional baseload generation. Additionally, "spent" EV battery packs are emerging as promising low-cost, second-life grid-storage assets. An estimated $12 billion needed by 2025 to finance construction of >7 GW of new natural gas plants for mitigating renewable intermittency (e.g., the Duck Curve) could be saved by integrating 1.5M EVs into California's grid, preventing unnecessary burden to ratepayers. By lowering the cost of battery storage below $100/kWh, Recipient's lithium-battery product will lower barriers to EV adoption, helping California reach milestones of the Zero Emission Vehicle program and reducing consumer energy bills by broadening the base of ratepayers to include large EV

[2] California Public Resources Code, Section 25711.5(a) requires projects funded by the Electric Program Investment Charge (EPIC) to result in ratepayer benefits. The California Public Utilities Commission, which established the EPIC in 2011, defines ratepayer benefits as greater reliability, lower costs, and increased safety (See CPUC "Phase 2" Decision 12-05-037 at page 19, May 24, 2012, http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF).

fleets. Lowered financial burden from utility bills will ensure that all Californians can enjoy the same access to renewable and efficient energy and the commensurate health and safety benefits.

As renewable energy generation increases across the electric grid, so too does the need for system flexibility, both daily and seasonally. In aiding renewables to displace conventional generation, improved EV batteries will directly deliver progress toward EPIC's goals to advance clean energy technologies.

Technological Advancement and Breakthroughs:[3]

This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by de-risking advanced lithium-metal batteries critical to driving customer adoption of EVs. Packaging Recipient's innovative LESA membrane product with an optimized electrolyte and current collector delivers a full cell solution to automotive customers that unlocks safe, energy-dense batteries capable of powering EVs for 400 miles at a fossil-fuel vehicle price point—relieving consumer range anxiety and increasing equitable access to clean transportation options. Deeper market penetration of EVs will boost grid resiliency and enable greater deployment of renewable resources through two-way vehicle-to-grid charging and low-cost second-life grid storage; both applications will serve to displace natural gas assets. This directly supports several California statutory and policy goals, including SB 100, SB 350, AB 32, and Executive Orders B-30-15 and N-79-20.

Agreement Objectives
The objectives of this Agreement are to:

- Rapidly optimize electrolyte formulations with Recipient's existing LESA product using ML algorithms with carefully crafted datasets to maximize safety (EUCAR 4), cycle life (600 cycles), and fast charge performance (2C to 80% capacity)
- Identify, fabricate, and validate current collector solutions for "anode-free" cells that boost safety and manufacturability to achieve highly competitive unit economics (< $100/kWh)
- Establish constructive feedback loop between Recipient and 3rd party cell manufacturers that enables capital-light demonstration of Recipient's full cell design at EV relevant scale, paving the path for additional investment in Recipient's in-house cell prototyping infrastructure
- Integrate all components into a multi-Ah anode-free hybrid lithium-metal cell prototype ready for customer validation
- Validate prototype battery cells with automotive manufacturers that meet or exceed performance targets of 400 Wh/kg, 825 Wh/L, and > 1 Ah for next-generation EV batteries

III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

Exhibit A
Scope of Work
Sepion Technologies, Inc.

The goal of this subtask is to establish the requirements for submitting project products (e.g., reports, summaries, plans, and presentation materials). Unless otherwise specified by the Commission Agreement Manager (CAM), the Recipient must deliver products as required below by the dates listed in the **Project Schedule (Part V).** All products submitted which will be viewed by the public, must comply with the accessibility requirements of Section 508 of the federal Rehabilitation Act of 1973, as amended (29 U.S.C. Sec. 794d), and regulations implementing that act as set forth in Part 1194 of Title 36 of the Federal Code of Regulations**.** All technical tasks should include product(s). Products that require a draft version are indicated by marking **"(draft and final)"** after the product name in the "Products" section of the task/subtask. If "(draft and final)" does not appear after the product name, only a final version of the product is required. With respect to due dates within this Scope of Work, **"days"** means working days.

The Recipient shall:

For products that require a draft version, including the Final Report Outline and Final Report

- Submit all draft products to the CAM for review and comment in accordance with the Project Schedule (Part V). The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt, unless otherwise specified in the task/subtask for which the product is required.
- Consider incorporating all CAM comments into the final product. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product.
- Submit the revised product and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period, or approves a request for additional time.

For products that require a final version only

- Submit the product to the CAM for acceptance. The CAM may request minor revisions or explanations prior to acceptance.

For all products

- Submit all data and documents required as products in accordance with the following:

Instructions for Submitting Electronic Files and Developing Software:

- **Electronic File Format**
  - Submit all data and documents required as products under this Agreement in an electronic file format that is fully editable and compatible with the California Energy Commission's (CEC) software and Microsoft (MS)-operating computing platforms, or with any other format approved by the CAM. Deliver an electronic copy of the full text of any Agreement data and documents in a format specified by the CAM, such as memory stick.

  The following describes the accepted formats for electronic data and documents provided to the CEC as products under this Agreement, and establishes the software versions that will be required to review and approve all software products:
  - Data sets will be in MS Access or MS Excel file format (version 2007 or later), or any other format approved by the CAM.

- Text documents will be in MS Word file format, version 2007 or later.
- Project management documents will be in Microsoft Project file format, version 2007 or later.

- **Software Application Development**

  Use the following standard Application Architecture components in compatible versions for any software application development required by this Agreement (e.g., databases, models, modeling tools), unless the CAM approves other software applications such as open source programs:
  - Microsoft ASP.NET framework (version 3.5 and up). Recommend 4.0.
  - Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5.
  - Visual Studio.NET (version 2008 and up). Recommend 2010.
  - C# Programming Language with Presentation (UI), Business Object and Data Layers.
  - SQL (Structured Query Language).
  - Microsoft SQL Server 2008, Stored Procedures. Recommend 2008 R2.
  - Microsoft SQL Reporting Services. Recommend 2008 R2.
  - XML (external interfaces).

  Any exceptions to the Electronic File Format requirements above must be approved in writing by the CAM. The CAM will consult with the CEC's Information Technology Services Branch to determine whether the exceptions are allowable.

MEETINGS

Subtask 1.2 Kick-off Meeting
The goal of this subtask is to establish the lines of communication and procedures for implementing this Agreement.

The Recipient shall:

- Attend a "Kick-off" meeting with the CAM, the Commission Agreement Officer (CAO), and any other CEC staff relevant to the Agreement. The Recipient will bring its Project Manager and any other individuals designated by the CAM to this meeting. The administrative and technical aspects of the Agreement will be discussed at the meeting. Prior to the meeting, the CAM will provide an agenda to all potential meeting participants. The meeting may take place in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

  The administrative portion of the meeting will include discussion of the following:
  - Terms and conditions of the Agreement;
  - Invoicing and auditing procedures;
  - Administrative products (subtask 1.1);
  - CPR meetings (subtask 1.3);
  - Match fund documentation (subtask 1.7);
  - Permit documentation (subtask 1.8);
  - Subcontracts (subtask 1.9); and

- Any other relevant topics.

The technical portion of the meeting will include discussion of the following:
- The CAM's expectations for accomplishing tasks described in the Scope of Work;
- An updated Project Schedule;
- Technical products (subtask 1.1);
- Progress reports (subtask 1.5);
- Final Report (subtask 1.6);
- Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
- Any other relevant topics.

- Provide *Kick-off Meeting Presentation* to include but not limited to:
  - Project overview (i.e. project description, goals and objectives, technical tasks, expected benefits, etc.)
  - Project schedule that identifies milestones
  - List of potential risk factors and hurdles, and mitigation strategy

- Provide an *Updated Project Schedule, Match Funds Status Letter,* and *Permit Status Letter*, as needed to reflect any changes in the documents.

The CAM shall:
- Designate the date and location of the meeting.
- Send the Recipient a *Kick-off Meeting Agenda*.

Recipient Products:
- Kick-off Meeting Presentation
- Updated Project Schedule *(if applicable)*
- Match Funds Status Letter (subtask 1.7) *(if applicable)*
- Permit Status Letter (subtask 1.8) *(if applicable)*

CAM Product:
- Kick-off Meeting Agenda

Subtask 1.3 Critical Project Review (CPR) Meetings
The goal of this subtask is to determine if the project should continue to receive CEC funding, and if so whether any modifications must be made to the tasks, products, schedule, or budget. CPR meetings provide the opportunity for frank discussions between the CEC and the Recipient. As determined by the CAM, discussions may include project status, challenges, successes, advisory group findings and recommendations, final report preparation, and progress on technical transfer and production readiness activities (if applicable). Participants will include the CAM and the Recipient and may include the CAO and any other individuals selected by the CAM to provide support to the CEC.

CPR meetings generally take place at key, predetermined points in the Agreement, as determined by the CAM and as shown in the Task List on page 1 of this Exhibit. However, the CAM may schedule additional CPR meetings as necessary. The budget will be reallocated to cover the additional costs borne by the Recipient, but the overall Agreement amount will not increase. CPR

meetings generally take place at the CEC, but they may take place at another location, or may be conducted via electronic conferencing (e.g., WebEx) as determined by the CAM.

The Recipient shall:

- Prepare and submit a *CPR Report* for each CPR meeting that: (1) discusses the progress of the Agreement toward achieving its goals and objectives; and (2) includes recommendations and conclusions regarding continued work on the project.
- Attend the CPR meeting.
- Present the CPR Report and any other required information at each CPR meeting.

The CAM shall:

- Determine the location, date, and time of each CPR meeting with the Recipient's input.
- Send the Recipient a *CPR Agenda* with a list of expected CPR participants in advance of the CPR meeting. If applicable, the agenda will include a discussion of match funding and permits.
- Conduct and make a record of each CPR meeting. Provide the Recipient with a schedule for providing a Progress Determination on continuation of the project.
- Determine whether to continue the project, and if so whether modifications are needed to the tasks, schedule, products, or budget for the remainder of the Agreement. If the CAM concludes that satisfactory progress is not being made, this conclusion will be referred to the Deputy Director of the Energy Research and Development Division.
- Provide the Recipient with a *Progress Determination* on continuation of the project, in accordance with the schedule. The Progress Determination may include a requirement that the Recipient revise one or more products.

Recipient Products:

- CPR Report(s)

CAM Products:

- CPR Agenda
- Progress Determination

Subtask 1.4 Final Meeting

The goal of this subtask is to complete the closeout of this Agreement.

The Recipient shall:

- Meet with CEC staff to present project findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement. This meeting will be attended by the Recipient and CAM, at a minimum. The meeting may occur in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.
  The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the CAM's discretion.
  - The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
  - The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:
    - Disposition of any procured equipment.

  - The CEC's request for specific "generated" data (not already provided in Agreement products).
  - Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.
  - "Surviving" Agreement provisions such as repayment provisions and confidential products.
  - Final invoicing and release of retention.
- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities*.
- Provide copies of *All Final Products* on a USB memory stick, organized by the tasks in the Agreement.

Products:
- Final Meeting Agreement Summary *(if applicable)*
- Schedule for Completing Agreement Closeout Activities
- All Final Products

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices
The goals of this subtask are to: (1) periodically verify that satisfactory and continued progress is made towards achieving the project objectives of this Agreement; and (2) ensure that invoices contain all required information and are submitted in the appropriate format.

The Recipient shall:
- Submit a monthly *Progress Report* to the CAM. Each progress report must:
  - Summarize progress made on all Agreement activities as specified in the scope of work for the preceding month, including accomplishments, problems, milestones, products, schedule, fiscal status, and an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. See the Progress Report Format Attachment for the recommended specifications.
- Submit a monthly or quarterly *Invoice* that follows the instructions in the "Payment of Funds" section of the terms and conditions, including a financial report on Match Funds and in-state expenditures.

Products:
- Progress Reports
- Invoices

Subtask 1.6 Final Report
The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this Agreement. When

creating the Final Report Outline and the Final Report, the Recipient must use the CEC Style Manual provided by the CAM.

Subtask 1.6.1 Final Report Outline

The Recipient shall:

- Prepare a *Final Report Outline* in accordance with the *Energy Commission Style Manual* provided by the CAM.

Recipient Products:

- Final Report Outline (draft and final)

CAM Product:

- Energy Commission Style Manual
- Comments on Draft Final Report Outline
- Acceptance of Final Report Outline

Subtask 1.6.2 Final Report

The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Energy Commission Style Manual, and Final Report Template provided by the CAM with the following considerations:
  - Ensure that the report includes the following items, in the following order:
    - Cover page (**required**)
    - Credits page on the reverse side of cover with legal disclaimer (**required**)
    - Acknowledgements page (optional)
    - Preface (**required**)
    - Abstract, keywords, and citation page (**required**)
    - Table of Contents (**required**, followed by List of Figures and List of Tables, if needed)
    - Executive summary (**required**)
    - Body of the report (**required**)
    - References (if applicable)
    - Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
    - Bibliography (if applicable)
    - Appendices (if applicable) (Create a separate volume if very large.)
    - Attachments (if applicable)
- Submit a draft of the Executive Summary to the TAC for review and comment.
- Develop and submit a *Summary of TAC Comments* received on the Executive Summary. For each comment received, the recipient will identify in the summary the following:
  - Comments the recipient proposes to incorporate.
  - Comments the recipient does propose to incorporate and an explanation for why.
- Submit a draft of the report to the CAM for review and comment. The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt.

- Incorporate all CAM comments into the *Final Report*. If the Recipient disagrees with any comment, provide a *Written Responses to Comments* explaining why the comments were not incorporated into the final product.
- Submit the revised *Final Report* electronically with any Written Responses to Comments within 10 days of receipt of CAM's Written Comments on the Draft Final Report, unless the CAM specifies a longer time period or approves a request for additional time.

Products:
- Summary of TAC Comments
- Draft Final Report
- Written Responses to Comments *(if applicable)*
- Final Report

CAM Product:
- Written Comments on the Draft Final Report

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds
The goal of this subtask is to ensure that the Recipient obtains any match funds planned for this Agreement and applies them to the Agreement during the Agreement term.

While the costs to obtain and document match funds are not reimbursable under this Agreement, the Recipient may spend match funds for this task. The Recipient may only spend match funds during the Agreement term, either concurrently or prior to the use of CEC funds. Match funds must be identified in writing, and the Recipient must obtain any associated commitments before incurring any costs for which the Recipient will request reimbursement.

The Recipient shall:
- Prepare a *Match Funds Status Letter* that documents the match funds committed to this Agreement. If no match funds were part of the proposal that led to the CEC awarding this Agreement and none have been identified at the time this Agreement starts, then state this in the letter.

  If match funds were a part of the proposal that led to the CEC awarding this Agreement, then provide in the letter:
  - A list of the match funds that identifies:
    - The amount of cash match funds, their source(s) (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied.
    - The amount of each in-kind contribution, a description of the contribution type (e.g., property, services), the documented market or book value, the source (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient must identify its owner and provide a contact name, address, telephone number, and the address where the property is located.
    - If different from the solicitation application, provide a letter of commitment from

an authorized representative of each source of match funding that the funds or contributions have been secured.

- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.
- Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

Products:

- Match Funds Status Letter
- Supplemental Match Funds Notification Letter *(if applicable)*
- Match Funds Reduction Notification Letter *(if applicable)*

Subtask 1.8 Permits

The goal of this subtask is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track. Permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement, with the exception of costs incurred by University of California recipients. Permits must be identified and obtained before the Recipient may incur any costs related to the use of the permit(s) for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a *Permit Status Letter* that documents the permits required to conduct this Agreement. If no permits are required at the start of this Agreement, then state this in the letter. If permits will be required during the course of the Agreement, provide in the letter:
    - A list of the permits that identifies: (1) the type of permit; and (2) the name, address, and telephone number of the permitting jurisdictions or lead agencies.
    - The schedule the Recipient will follow in applying for and obtaining the permits.

  The list of permits and the schedule for obtaining them will be discussed at the Kick-off meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and copies of the permits will be developed. The impact on the project if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in progress reports and will be a topic at CPR meetings.
- If during the course of the Agreement additional permits become necessary, then provide the CAM with an *Updated List of Permits* (including the appropriate information on each permit) and an *Updated Schedule for Acquiring Permits*.
- Send the CAM a *Copy of Each Approved Permit*.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

Products:

- Permit Status Letter
- Updated List of Permits *(if applicable)*
- Updated Schedule for Acquiring Permits *(if applicable)*

- Copy of Each Approved Permit *(if applicable)*

Subtask 1.9 Subcontracts
The goals of this subtask are to: (1) procure subcontracts required to carry out the tasks under this Agreement; and (2) ensure that the subcontracts are consistent with the terms and conditions of this Agreement.

The Recipient shall:
- Manage and coordinate subcontractor activities in accordance with the requirements of this Agreement.
- Incorporate this Agreement by reference into each subcontract.
- Include any required Energy Commission flow-down provisions in each subcontract, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subcontract terms.
- If required by the CAM, submit a draft of each *Subcontract* required to conduct the work under this Agreement.
- Submit a final copy of each executed subcontract.
- Notify and receive written approval from the CAM prior to adding any new subcontractors (see the discussion of subcontractor additions in the terms and conditions).

Products:
- Subcontracts *(draft if required by the CAM)*

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)
The goal of this subtask is to create an advisory committee for this Agreement. The TAC should be composed of diverse professionals. The composition will vary depending on interest, availability, and need. TAC members will serve at the CAM's discretion. The purpose of the TAC is to:
- Provide guidance in project direction. The guidance may include scope and methodologies, timing, and coordination with other projects. The guidance may be based on:
  - Technical area expertise;
  - Knowledge of market applications; or
  - Linkages between the agreement work and other past, present, or future projects (both public and private sectors) that TAC members are aware of in a particular area.
- Review products and provide recommendations for needed product adjustments, refinements, or enhancements.
- Evaluate the tangible benefits of the project to the state of California, and provide recommendations as needed to enhance the benefits.
- Provide recommendations regarding information dissemination, market pathways, or commercialization strategies relevant to the project products.
- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.

- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.
- Advocate, to the extent the TAC members feel is appropriate, on behalf of the project in its effort to build partnerships, governmental support and relationships with a national spectrum of influential leaders.
- Ask probing questions that insure a long-term perspective on decision-making and progress toward the project's strategic goals.

The TAC may be composed of qualified professionals spanning the following types of disciplines:

- Researchers knowledgeable about the project subject matter;
- Members of trades that will apply the results of the project (e.g., designers, engineers, architects, contractors, and trade representatives);
- Public interest market transformation implementers;
- Product developers relevant to the project;
- U.S. Department of Energy research managers, or experts from other federal or state agencies relevant to the project;
- Public interest environmental groups;
- Utility representatives;
- Air district staff; and
- Members of relevant technical society committees.

The Recipient shall:

- Prepare a *List of Potential TAC Members* that includes the names, companies, physical and electronic addresses, and phone numbers of potential members. The list will be discussed at the Kick-off meeting, and a schedule for recruiting members and holding the first TAC meeting will be developed.
- Recruit TAC members. Ensure that each individual understands member obligations and the TAC meeting schedule developed in subtask 1.11.
- Prepare a *List of TAC Members* once all TAC members have committed to serving on the TAC.
- Submit *Documentation of TAC Member Commitment* (such as Letters of Acceptance) from each TAC member.

Products:

- List of Potential TAC Members
- List of TAC Members
- Documentation of TAC Member Commitment

Subtask 1.11 TAC Meetings

The goal of this subtask is for the TAC to provide strategic guidance for the project by participating in regular meetings, which may be held via teleconference.

The Recipient shall:

- Discuss the TAC meeting schedule with the CAM at the Kick-off meeting. Determine the number and location of meetings (in-person and via teleconference) in consultation with the CAM.
- Prepare a *TAC Meeting Schedule* that will be presented to the TAC members during recruiting. Revise the schedule after the first TAC meeting to incorporate meeting comments.
- Prepare a *TAC Meeting Agenda* and *TAC Meeting Back-up Materials* for each TAC meeting.
- Organize and lead TAC meetings in accordance with the TAC Meeting Schedule. Changes to the schedule must be pre-approved in writing by the CAM.
- Prepare *TAC Meeting Summaries* that include any recommended resolutions of major TAC issues.

The TAC shall:

- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.
- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.
- Advocate on behalf of the project in its effort to build partnerships, governmental support and relationships with a national spectrum of influential leaders.
- Ask probing questions that insure a long-term perspective on decision-making and progress toward the project's strategic goals.
- Review and provide comments to proposed project performance metrics.
- Review and provide comments to proposed project Draft Technology Transfer Plan.

Products:

- TAC Meeting Schedule (draft and final)
- TAC Meeting Agendas (draft and final)
- TAC Meeting Back-up Materials
- TAC Meeting Summaries

Subtask 1.12 Project Performance Metrics

The goal of this subtask is to identify key performance targets for the project. The performance targets should be a combination of scientific, engineering, techno-economic, and/or programmatic metrics that provide the most significant indicator of the research or technology's potential success.

The Recipient shall:

- Complete and submit the draft *Project Performance Metrics Questionnaire* to the CAM prior to the Kick-off Meeting.
- Present the draft *Project Performance Metrics Questionnaire* at the first TAC meeting to solicit input and comments from the TAC members.
- Develop and submit a *TAC Performance Metrics Summary* that summarizes comments received from the TAC members on the proposed project performance metrics. The *TAC*

Performance Metrics Summary will identify:
  - TAC comments the recipient proposes to incorporate into the final *Project Performance Metrics Questionnaire*.
  - TAC comments the recipient does not propose to incorporate with and explanation why.
- Submit a final *Project Performance Metrics Questionnaire* with incorporated TAC feedback.
- Develop and submit a *Project Performance Metrics Results* document describing the extent to which the recipient met each of the performance metrics in the final *Project Performance Metrics Questionnaire*.
- Discuss the final *Project Performance Metrics Questionnaire* and *Project Performance Metrics Results* at the Final Meeting.

Products:
- Project Performance Metrics Questionnaire (draft and final)
- TAC Performance Metrics Summary
- Project Performance Metrics Results

Exhibit A
Scope of Work
Sepion Technologies, Inc.

IV. TECHNICAL TASKS

TASK 2 DATA-DRIVEN ELECTROLYTE OPTIMIZATION

The goal of this task is to improve safety, cycle life, fast-charging capability, and capacity utilization of Recipient's LESA enabled hybrid lithium-metal batteries under EV relevant conditions by applying state-of-the-art ML algorithms to efficiently optimize electrolyte formulations. Recipient's LESA membrane exerts molecular level control over electrolyte mass transport to the anode creating opportunities to exploit novel electrolyte formulas that offer performance and cost advantages over traditional carbonate electrolytes but are incompatible with membrane-free lithium-metal batteries. Task 2 is broken into three subtasks

Subtask 2.1 Design of Experiments Electrolyte Evaluation Plan

The goal of this subtask is to perform an extensive Design of Experiments (DOE) to deliver a high-fidelity, high-volume dataset that maximizes the accuracy and efficiency of the data-driven electrolyte downselection process. The first screen will involve up to 100 electrolyte formulations for initial model training with subsequent screens anticipated to consist of 50–100 formulations resulting in > 250 unique electrolyte formulations being screened during this project.

The Recipient shall:

- Evaluate the variables listed below for the DOE process. Those identified as providing the greatest return on investment (ROI) will be included in the electrolyte screen. ROI will be determined by weighting existing knowledge about electrolyte properties and impact on cell performance, ease of measurement, and anticipated quality of collected data.
    - Electrolyte formulation – solvents, salts, additives, and ratios with a fixed cost threshold. Targeting over 250 unique formulations over the course of this project.
    - Measured or computed electrolyte properties – conductivity, density, freeing point, viscosity, flash point, voltage stability, and water concentration
    - Membrane identity – Recipient will test between one and three of their leading LESA membrane designs
    - Cell format – full Li|NMC cells, symmetric Li|Li cells, asymmetric Li|Cu cells
    - Data replication – number of cells per formulation and control cells
    - Formation conditions – temperature, rest time, rest voltage, charge/discharge current density
    - Cell cycling conditions and data collection – coulombic efficiency, impedance, area specific resistance, cycle life to 80% capacity, and rate performance
    - Post-mortem analysis – visual inspection of lithium metal anode, surface characterization by X-ray photoelectron spectroscopy, scanning electron microscopy of lithium metal anodes with image analysis such as ImageJ
- Create a *DOE Electrolyte Test Plan* that includes a detailed assessment of each variable listed above, the potential impact on the electrolyte screen, anticipated ROI, key risks, risk mitigation plan, a list of the electrolyte formulations to be tested, and an action plan to execute the data-driven electrolyte optimization.

Products:

- DOE Electrolyte Test Plan

Subtask 2.2 Equipment and Electrolyte Sourcing

Exhibit A
Scope of Work
Sepion Technologies, Inc.

The goal of this subtask is to source additional equipment and materials needed to execute DOE Electrolyte Test Plan in accordance with the Budget. This includes, but not limited to, conductivity probes, viscometers, and a Karl Fischer titrator to measure electrolyte properties, additional cell fabrication and testing infrastructure, lithium foil, NMC cathodes, base separators, cell packaging, cell fixturing, and software licenses to improve *a priori* down selection of top candidates in accordance with the Budget. New compositions of matter will be synthesized and characterized by Recipient. Python code will be written to automate data analysis to reduce the analytical burden on Recipient's staff.

The Recipient shall:

- Prepare an *Infrastructure and Inventory Update* for CAM to verify preparedness for Subtask 2.3.

Products:

- Infrastructure and Inventory Update

Subtask 2.3 Cell Testing, Machine Learning Model Training, and Electrolyte Downselect
The goal of this subtask is to formulate electrolytes, measure fundamental properties, fabricate single-layer pouch cells with lithium metal anodes and NMC cathodes, and execute four cycles of data collection and ML model training.

The Recipient shall:

- Prepare electrolytes and measure fundamental properties such as conductivity, transference number, vapor pressure, viscosity, self-extinguishing time, voltage stability, and water concentration.
- Fabricate single-layer pouch cells and execute on the *DOE Electrolyte Test Plan* from Subtask 2.1.
- Optimize cell performance focusing on the following customer-identified performance criteria:
  - Cycle life – targeting > 600 cycles to 80% initial capacity corresponding to > 247,000 lifetime vehicle miles with a 400 Wh/kg cell
  - Safety – quantified by vapor pressure, self-extinguishing time, and flash point
  - Fast charging – accessible capacity when charging at 2C
  - Capacity utilization – maintain cell design targets of 400 Wh/kg and 825 Wh/L at common automotive discharge rates in the C/3 to 1C range
  - Self-discharge – targeting less than 1% capacity loss/month
- Analyze cell cycling and post-mortem data between each cycle of data collection and model training. Establish a comprehensive electrolyte-performance database amenable to quick searching and non-obvious trend identification.
- Identify most desirable and sensitive electrolyte features to establish structure-property relationships that ground performance enhancements in fundamental electrolyte physics. This knowledge will provide an advantageous starting point for future customer driven downselection efforts.
- Apply molecular dynamics and density functional theory computations on the top 10 electrolyte-membrane pairs to deepen understanding of the role of electrolyte-membrane interactions in delivering exceptional Li-metal anode performance. Feed this information into Recipient's ongoing membrane development efforts.

- Downselect and source in larger quantity the top twelve electrolyte formulations for cell validation and safety testing outlined in Task 4.
- Prepare an *Electrolyte Supply Chain and Cost Model Report* identifying key cost-performance relationships of downselected electrolyte formulations, potential suppliers, and supply chain and scale up risks and mitigation plans.

Products:

- Electrolyte Supply Chain and Cost Model Report

TASK 3 "ANODE-FREE" CURRENT COLLECTOR TESTING AND VALIDATION

The goal of this task is to improve the safety, cost, and manufacturability of Recipient's hybrid lithium-metal batteries by evaluating "anode-free" current collectors, a promising but underdeveloped component ripe for innovation. "Anode-free" refers to a cell fabricated without a pure lithium anode wherein the lithium anode originates from the cathode after the first charge and there is no excess lithium. This is how conventional lithium-ion cells work today. Lithium alloys, conductive carbon-based scaffolds, metallized plastics, and non-strategic metals will be tested as "anode-free" current collectors to eliminate the need for thin lithium foil anodes in future cell designs. Thin lithium foils are used in current lithium-metal cells to provide a suitable layer for lithium nucleation during charging and to deliver reserve capacity to offset the rapid degradation common to most lithium-metal batteries. However, thin (< 100 μm) lithium foil is expensive, only produced in R&D pilot lines, and difficult to handle with conventional roll-to-roll cell manufacturing infrastructure. Its use amplifies the potential for catastrophic cell failure by providing additional "fuel" in the event of a fire, and it reduces the overall energy density and specific energy of finished cells. Successful implementation of an "anode-free" design will differentiate Recipient's cell design by reducing cost and increasing energy density and specific energy in full cells.

Subtask 3.1 Current Collector Design of Experiments

The goal of this subtask is to downselect top ten candidate current collectors for initial evaluation in consultation with leading experts from academia and industry that are committed to supporting this project.

The Recipient shall:

- Evaluate candidate current collectors based on the following criteria:
  - Potential for smooth lithium nucleation and growth – thermodynamic nucleation overpotential and Li surface diffusion activation energy evaluated with density functional theory computations
  - Safety – evaluate thermal stability, conductivity, and "fuse-like" potential with Soteria's current collector to mitigate shorting hazards
  - Density – factors directly into cell energy density
  - Mechanical properties – tensile strength and modulus related to thickness
  - Availability – is it already commercial or does it need to be produced?
  - Sustainability – is it composed of low-impact and recyclable materials?
  - Manufacturability – ease of manufacturing and anticipated cost
  - Tab bonding – compatibility with standard ultrasonic tab welding for current extraction
  - Reduction and alloying potential – impact of lithium plating on the fundamental chemistry of the material

- Develop current collector testing protocol applying DOE methodology and produce a *Current Collector Testing Plan* that outlines initial downselect of candidate materials and how current collectors will be evaluated by taking into consideration the following experimental design aspects:
  - Cell format – current collector NMC cells or asymmetric lithium current collector cells
  - Data replication – number of cells per formulation and control cells
  - Electrolyte formula informed by Task 2
  - Formation conditions – temperature, rest time, rest voltage, charge/discharge current density
  - Cell cycling conditions and data collection – Sand's time, high-precision Coulometry, Coulombic efficiency, impedance, area specific resistance, cycle life to 80% capacity, rate performance
  - Post-mortem analysis – visual inspection of plated lithium, surface characterization by X-ray photoelectron spectroscopy, scanning electron microscopy of plated lithium with image analysis such as ImageJ

Products:
- Current Collector Testing Plan

Subtask 3.2 Source and Evaluate Anode-Free Current Collectors
The goal of this subtask is to source or produce leading current collector designs. Recipient's facility is well equipped to produce conductive carbon-based current collectors with roll-to-roll production infrastructure.

The Recipient shall:
- Fabricate single-layer pouch cells with current collector candidates, and execute three rounds of current collector evaluation, downselection, and optimization as outlined in the earlier tasks focusing on the following customer-identified performance criteria:
  - Cycle life – targeting > 600 cycles to 80% initial capacity corresponding to > 247,000 lifetime vehicle miles with a 400 Wh/kg cell
  - Safety – quantified by self-extinguishing time
  - Fast charging – accessible capacity when charging at 2C
  - Capacity utilization – maintain cell design targets of 400 Wh/kg and 825 Wh/L at common automotive discharge rates in the C/3 to 1C range
  - Self-discharge – targeting less than 1% capacity loss/month
- Downselect and source in larger quantity the top four current collector candidates for cell validation and safety testing outlined in Task 4.
- Prepare a *CPR Report* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.
- Prepare a *Current Collector Supply Chain and Cost Model Report* identifying key cost-performance relationships of leading "anode-free" current collector candidates benchmarked to thin lithium foil, identify potential suppliers, and outline supply chain and production risks and mitigation plans.

Products:
- CPR Report #1
- Current Collector Supply Chain and Cost Model Report

Exhibit A
Scope of Work
Sepion Technologies, Inc.

TASK 4 CELL VALIDATION, SAFETY TESTING, AND MARKET FACILITATION ACTIVITIES
The goal of this task is to demonstrate market readiness of Recipient's hybrid lithium-metal cells, targeting an improvement from TRL 4 to TRL 6, by fabricating multi-layer pouch cells with > 2 amp-hour (Ah) capacity (cell phone battery size) and evaluating them under standard EV duty cycles and safety tests in house, with 3rd parties, and with potential automotive customers. This task, executed in parallel with Task 2 and Task 3, ensures that the results of Task 2 and Task 3 translate into real-world outcomes moving the TRL needle from 4–6 by the end of the project. Success of these multi-Ah cell cycling and safety tests will attract strategic joint-development agreements with automotive partners and follow on equity investment needed to bring Recipient's breakthrough lithium-metal batteries nearer to commercial reality and impact on California's energy and climate goals.

Subtask 4.1 Full Cell Design Audit and Cathode Sourcing
The goal of this subtask is to finalize full cell stack design that delivers or exceeds 400 Wh/kg and 825 Wh/L. Source cathodes and test cells from potential cell building partners and validate performance. Rank the three identified cell building partners and determine which to move forward with.

The Recipient shall:

- Perform a full cell design audit that includes, but is not limited to, the following components and parameters:
  - Cathode active material – NMC 811, NMC 622, or nickel cobalt aluminum oxide
  - Cathode loading and porosity – targeting > 4 mAh/cm^2 and < 36% porosity
  - Conductive carbon and binder – input from cell building partner at < 5% cathode mass
  - Cathode current collector – aluminum or metalized plastic from Soteria
  - Upper cutoff voltage - > 4.3 V vs. Li/Li$^+$
  - Separator – polyethylene or polypropylene with or without ceramic coating at < 20 µm thick
  - Anode – initially 30 µm thick lithium foil on copper followed by incorporating the output of Task 3
  - Electrolyte – Recipient's current proprietary formula followed by incorporating the output of Task 2; electrolyte volume will be less than 20% excess separator and cathode pore volume
  - Cell format – standard pouch or cylindrical cell to be finalized with cell building partner and input from ongoing customer discovery
- Validate cathode performance from the identified cell building partners. Downselect cell building partner best suited for Recipient's BRIDGE project objectives. Source cathode supply in support of Tasks 2–4.
- Prepare a *Full Cell Design Report* and deliver it to the CAM for review. This report will cover the key findings, risks, and mitigation actions taken to meet the objectives of Subtask 4.1 and support Tasks 2 and 3.

Products:

- Full Cell Design Report

Subtask 4.2 3rd Party Cell Validation and Safety Testing

The goal of this subtask is to demonstrate commercial feasibility of the downselected electrolytes and current collectors optimized in Task 2 and Task 3, respectively, by validating equal or improved performance when cell capacity is increased 100-fold from single-layer to multi-layer pouch cells. Fabrication of multi-Ah cells and destructive safety testing requires expensive infrastructure; therefore, cells will be built and safety tests will be performed with the downselected cell building partner.

The Recipient shall:

- Validate downselected electrolytes from Task 2 in high-capacity multi-layer pouch cells. Four different cell builds of 36 cells each consisting of three different electrolyte formulations (3 formulations x 12 cells each) will be executed in support of Task 2. These cells will be split into sets of 4 with some cells tested by the cell building partner, some cells tested by Recipient, and some cells subjected to destructive safety testing. A total of 144 cells will be built and tested, evaluating 12 downselected electrolyte formulations at multi-Ah scale.
- Validate downselected "anode-free" current collectors from Task 3 in high-capacity multi-layer pouch cells. Three different cell builds of 36 cells each consisting of three different current collectors (3 current collectors x 12 cells each) will be executed in support of Task 3. These cells will be split into sets of 4 with some cells tested by the cell building partner, some cells tested by Recipient, and some cells subjected to destructive safety testing. A total of 108 cells will be built and tested.
- Prepare a *Safety Certification De-Risking Plan* to highlight key risks and mitigation strategies to ensure EUCAR 4 or better is achieved by the end of the program.
- Verify safety enhancement afforded by downselected electrolyte and current collector from Tasks 2 and 3, respectively, with three rounds of destructive safety testing performed by cell building partners. These tests will include accelerated rate calorimetry, nail penetration, overcharge, and crush testing. Test results will be measured vs specifications outlined in UN/DOT 38.3 5th Edition, Amendment 1, IEC 62133-2:2017, and UL 2054 2nd Edition or others as identified by CAM.
- Any of the above number of cells, builds, formulations, etc. may be adjusted by the CAM in writing.

Products:

- Safety Certification De-Risking Plan

Subtask 4.3 Market Facilitation and Customer Testing

The goal of this subtask is to ship multi-Ah cells to potential customers for testing and feedback. Successful validation will verify the transition to TRL 6 by the end of this project. These demonstrations will drive deeper engagement with the EV ecosystem and lead to paid joint-development, strategic investment, and purchase orders with cell and EV manufacturers. Testing customers shall be located in a California IOU service territory.

The Recipient shall:

- Fabricate multi-Ah test cells with cell building partner and deliver to interested customers, including Nissan Motors for evaluation.
- Advance improved electrolyte, "anode-free" current collector, and LESA designs to support existing partnership with cell manufacturer.

- Prepare a *Customer Testing Report* that summarizes the outcomes and next steps from customer testing. Customers may be anonymized by industry and market segment in the report to honor non-disclosure agreements.
- Achieve TRL 6 for Recipient's hybrid lithium-metal cells through demonstration of full-scale cell prototype validated under a wide range of EV driving simulants. Compile supporting information including results from the cell cycling and safety testing. Provide analysis of the implications of these results meeting EV specifications in operating system/environment.
- Prepare an *Intellectual Property Management Plan* covering how Recipient will protect inventions made with the support of the BRIDGE grant and how that IP portfolio will be leveraged to capture the full value of these innovations in accordance with Agreement terms and conditions.
- Develop *Pilot Manufacturing Plan* informed by the extensive engagement with cell build partners outlining the best path forward to manufacturing multi-layer pouch cells at pilot scale for customer validation. This plan will serve as a foundation justifying the next round of venture capital investment and deliver on the intended legacy of the BRIDGE program by "bridging" Recipient from a grant-supported initial demonstration to successful commercial pilot production and strategic partnership.
- No personally identifying information will be provided in CEC products.

Products:
- Intellectual Property Management Plan
- Customer Testing Report
- Pilot Manufacturing Plan

TASK 5 EVALUATION OF PROJECT BENEFITS
The goal of this task is to report the benefits resulting from this project.

The Recipient shall:
- Complete three Project Benefits Questionnaires that correspond to three main intervals in the Agreement: (1) *Kick-off Meeting Benefits Questionnaire*; (2) *Mid-term Benefits Questionnaire*; and (3) *Final Meeting Benefits Questionnaire*.
- Provide all key assumptions used to estimate projected benefits, including targeted market sector (e.g., population and geographic location), projected market penetration, baseline and projected energy use and cost, operating conditions, and emission reduction calculations. Examples of information that may be requested in the questionnaires include:

    - <u>For Product Development Projects and Project Demonstrations:</u>
        - Published documents, including date, title, and periodical name.
        - Estimated or actual energy and cost savings, and estimated statewide energy savings once market potential has been realized. Identify all assumptions used in the estimates.
        - Greenhouse gas and criteria emissions reductions.
        - Other non-energy benefits such as reliability, public safety, lower operational cost, environmental improvement, indoor environmental quality, and societal benefits.
        - Data on potential job creation, market potential, economic development, and increased state revenue as a result of the project.

- A discussion of project product downloads from websites, and publications in technical journals.
- A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Additional Information for Product Development Projects:
    - Outcome of product development efforts, such copyrights and license agreements.
    - Units sold or projected to be sold in California and outside of California.
    - Total annual sales or projected annual sales (in dollars) of products developed under the Agreement.
    - Investment dollars/follow-on private funding as a result of Energy Commission funding.
    - Patent numbers and applications, along with dates and brief descriptions.
- Additional Information for Product Demonstrations:
    - Outcome of demonstrations and status of technology.
    - Number of similar installations.
    - Jobs created/retained as a result of the Agreement.

- For Information/Tools and Other Research Studies:
    - Outcome of project.
    - Published documents, including date, title, and periodical name.
    - A discussion of policy development. State if the project has been cited in government policy publications or technical journals, or has been used to inform regulatory bodies.
    - The number of website downloads.
    - An estimate of how the project information has affected energy use and cost, or have resulted in other non-energy benefits.
    - An estimate of energy and non-energy benefits.
    - Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.
    - A discussion of project product downloads from websites, and publications in technical journals.
    - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.

- Respond to CAM questions regarding responses to the questionnaires.

The CEC may send the Recipient similar questionnaires after the Agreement term ends. Responses to these questionnaires will be voluntary.

Products:

- Kick-off Meeting Benefits Questionnaire
- Mid-term Benefits Questionnaire
- Final Meeting Benefits Questionnaire

TASK 6 TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

Exhibit A
Scope of Work
Sepion Technologies, Inc.

The goal of this task is to conduct activities that will accelerate the commercial adoption of the technology being supported under this agreement. Eligible activities include, but are not limited to, the following:

- Scale-up analysis including manufacturing analysis, independent design verification, and process improvement efforts.
- Technology verification testing, or application to a test bed program located in California.
- Legal services or licensing to secure necessary intellectual property to further develop the technology
- Market research, business plan development, and cost-performance modeling.
- Entry into an incubator or accelerator program located in California.

The Recipient Shall:

- Develop and submit a *Technology Transfer Plan (Draft/Final)* that identifies the proposed activities the recipient will conduct to accelerate the successful commercial adoption of the technology.
- Present the *Draft Technology Transfer Plan* to the TAC for feedback and comments.
- Develop and submit a *Summary of TAC Comments* that summarizes comments received from the TAC members on the *Draft Technology Transfer Plan*. This document will identify:
  - TAC comments the recipient proposes to incorporate into the *Final Technology Transfer Plan*.
  - TAC comments the recipient does not propose to incorporate with and explanation why.
- Submit the *Final Technology Transfer Plan* to the CAM for approval.
- Implement activities identified in *Final Technology Transfer Plan.*
- Develop and submit a *Technology Transfer Summary Report (Draft/Final)* that includes high level summaries of the activities, results, and lessons learned of tasks performed relating to implementing the *Final Technology Transfer Plan*. This report should not include any proprietary information.
- When directed by the CAM, develop presentation materials for an CEC- sponsored conference/workshop(s) on the project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the CEC.
- Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.

Products:

- Technology Transfer Plan (Draft/Final)
- Summary of TAC Comments
- Technology Transfer Summary Report (Draft/Final)
- High Quality Digital Photographs

Exhibit A
Scope of Work
Sepion Technologies, Inc.

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

RESOLUTION NO: 21-0317-5d

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: SEPION TECHNOLOGIES, INC.

RESOLVED, that the State Energy Resources Conservation and Development Commission (CEC) adopts the staff CEQA findings contained in the Agreement or Amendment Request Form (as applicable); and

RESOLVED, that the CEC approves Agreement EPC-20-015 with Sepion Technologies, Inc. for a $1,400,000 grant to advance the development of safe anode-free hybrid lithium-metal cells from a lab-scale validation to a pre-prototype. This project will enhance two key components--the electrolyte and an anode-free current collector; and

FURTHER BE IT RESOLVED, that the Executive Director or his/her designee shall execute the same on behalf of the CEC.

CERTIFICATION

The undersigned Secretariat to the CEC does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the CEC held on March 17, 2021.

AYE:
NAY:
ABSENT:
ABSTAIN:

_____
Patricia Carlos
Secretariat