**Check One: ☐Project ☒Review ☐Collaboration**

 **☐Workshop ☐Other**

| **Descriptive Title** | Advanced Powder Processing & PSD Control for Energy Storage Batteries |
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| **Working Title[[1]](#footnote-0)** | Battery Powder PSD Control & Processing |
| **Technical Area[[2]](#footnote-1)** | Systems Engineering (SE) |
| **Date** | June 17, 2025 |
| **Short Description** | **Background:**Lithium-ion batteries are manufactured in diverse form factors, including cylindrical, coin, pouch, and prismatic cells, each with unique designs and functions. These varied cell architectures, across different manufacturers, demand exceptionally rigorous control over input materials, particularly the powders used in electrodes and solid-state electrolytes. Among these powders, particle size and surface area are two critical parameters that require exquisite control within extremely narrow tolerance ranges. Achieving the highly precise and narrowly distributed metrics unique to each cell type and manufacturer is paramount for battery performance and reliability.**Description**Battery manufacturers employ a range of size reduction and classification techniques—such as cryogenic milling, jet milling, and air classification—to precisely control particle morphology and surface area. These processes are critical for improving energy density, safety, and cycle life in both conventional and solid-state systems.The materials to examine will include:* **Cathode/anode active materials** (e.g., NCM, LFP, LCO, Graphite, Si-C)
* **Solid-state electrolytes** (e.g., LPSCl, LLZO, LATP)

Additionally, the review will discuss how equipment selection—such as the use of cryogenic ball milling for silicon processing—affects particle size, shape, surface area, and the potential for material contamination. |
| **Objectives** | This review provides an overview of the technologies currently used for size reduction and classification in the production of cathode, anode, and solid electrolyte materials. Additional particle processes are used and will be briefly discussed.Opportunities and gaps to address in future research will be identified |
| **Scope** | Emphasis will be on particulate materials for li-ion batteries. |

| **Recommended Contractors (2 or 3)** |
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* broaden scope to applications outside of batteries: Simon.
* include safety and handling of hazardous materials.
1. Title used in meeting agendas and file archives [↑](#footnote-ref-0)
2. One or more from the following list: W = wet systems; D = dry systems; F = particle formation; SR = size reduction; M = modeling; SE = systems engineering [↑](#footnote-ref-1)