

## Panel Summary Template

### **Objective(s) of the proposal**

(A sentence or two stating what the proposal is about)

This is a well-written research plan with will transform the process of 3D printing energy storage devices through the integration of femtosecond laser processing and extrusion-based printing with nanomaterials.

### **Intellectual Merit:**

#### *Strengths:*

The current barriers to the application of nanofabrication and 3D printing methods are well defined and potential solutions are laid out. The PI has experience and preliminary data for many of the proposed techniques, indicating the PI's capability to carry out this novel printing process. The central hypothesis that graphitized nanostructures and printable mesoporous architectures can provide high charge/discharge rate performance and capacitance retentions by significantly enhancing the internal electrical conductivity and Na-ion diffusivity is clear, concise and testable. The PI has laid out 4 objectives to systematically create, test and evaluate the 3-D printed highly conductive electrodes. The successful creation of these electrodes will influence a wide-range of industries and applications from energy grids to remote sensors to consumer electronics, making this research a potentially valuable endeavor.

#### *Weaknesses:*

The project timeline is not really clear as every Objective appears to be happening concurrently.

### **Broader Impacts:**

#### *Strengths:*

The PI has laid out 3 separate events aimed at K-12 students and teachers. The PI has previously participated in these workshops and events over the past couple of years. The PI included assessment criteria to judge the success of these workshops.

#### *Weaknesses:*

The integrating of research into undergraduate and graduate classes is fine but I would have appreciated more detail on the workshops and how this work is incorporated into those. There was limited detail on how the broader impacts would impact URM students.

### **Panel Summary Statement**

(One or two sentences summarizing the discussion – DO NOT mention any aspect of funding)

The summary was read by/to the panel and the panel concurred that the summary accurately reflects the panel discussion.