TIP Project Brief – 100006/11H002

Manufacturing
Volume Production of Nanocomposite Alloy Anode Materials for Lithium-Ion Batteries

Develop technology necessary to scale up production of the company's novel nanocomposite material for high-performance lithium batteries by a factor of a thousand, potentially enabling safe, powerful and economical batteries for electric vehicles and other demanding applications.

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- Project Performance Period: 2/1/2011 - 1/31/2014
- Total project (est.): $6,197 K
- Requested TIP funds: $3,000 K

ActaCell, Inc., a start-up company based in Austin, Texas, plans to develop technology necessary to scale up production of the company's novel nanocomposite material for high-performance lithium batteries by a factor of a thousand, potentially enabling safe, powerful and economical batteries for electric vehicles and other demanding applications.

Lithium-ion batteries could be an excellent choice for large energy storage applications such as plug-in hybrid (PHEV) and electric vehicles (EV), because they can store far more energy in a smaller space than other types of batteries—which translates to lighter, more efficient vehicles with greater range. However, lithium batteries face several technical challenges, principally related to achieving a high level of safety while maintaining a low cost. One of the primary safety issues in current lithium-ion batteries is related to the use of graphite as the battery's anode and the electrochemical interaction between the graphite anode and the electrolyte. ActaCell has developed a novel nanocomposite anode material, based on research at the University of Texas at Austin, which greatly reduces the reactivity of the anode under abusive conditions. The ActaCell anode material also is, in principle, significantly less expensive to produce.

To be commercially viable, ActaCell must be able to scale up the production of its nanocomposite anode material from the current laboratory batches of about 5 grams to 5 kilograms economically. To achieve this, the company proposes to use a technique called Reactive High Energy Milling (RHEM) that drives a chemical reaction via the use of a high energy reactive milling in one single reaction scheme. Commercial scale use of RHEM is untried in the lithium battery industry, and is complicated by a number of process variables that are not expected to scale uniformly, but is critical to keep the processing and overall materials cost low. The scale-up of this synthesis process will be a key innovation not only in the lithium-ion battery industry, but also as a low-cost manufacturing technique for other related materials. These combined innovations are key to advancing adoption of large-scale energy storage, offering potential transformation of both the automotive and electric utility sectors.

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