Silicon-Lead Battery Power & Performance

2018 INNOVATION AWARD WINNER
BIPOLAR BREAKTHROUGH
A BETTER WAY TO BUILD A BIPOLAR BATTERY IS NOW POSSIBLE

Silicon Joule® bipolar architecture offers design-driven, superior performance.

- The advantages of a bipolar approach is well accepted, but previously unviable due to cost and practical limitations of materials
- 30 years of cost reductions in solar manufacturing has created a new, low cost option
- 50 years of semiconductor processing makes the tools widely available in low cost countries
- Demand for greater battery performance in confluence with availability of low cost, high quality silicon bipoles is creating a great opportunity
ADVANTAGES OF SILICON

- Light and stiff, doped to low resistivity
- Impervious to sulfuric acid
- High thermal conductivity
- Silicides offer wide, stable electrochemistry window
- Low expansion and ductility create stable sealing surface
- Electroplated lead contact layer can be tailored to paste chemistry
SOLAR SILICON – AN INEXPENSIVE PRODUCTION MATERIAL

» 25 Billion solar wafers produced each year
» High volume, high quality supply chain established in low cost regions
» Batteries can use even lower grade silicon with material cost as low as $2/kg and silicon weighs less than lead
SILICON JOULE® PERFORMANCE EXAMPLE – SUPERIOR CYCLE LIFE

Gridtential Bipolar Technology versus Standard Monoblock

*80% DOD
Silicon Joule® is the most significant technology advancement for lead batteries in 20 years.

- Step-change improvements in power & energy density, cycle life, weight & charge acceptance
- Retaining the proven low cost, safety and recycling attributes of lead
- Can convert the existing $150m+ lead battery factories for <$10m each
- Leveraging the huge global solar wafer industry for robust, low cost supply chain.
SILICON JOULE® RECAP

• Silicon Valley VC and battery industry backed company
• Developer of Silicon Joule® bipolar technology
• Deliver our technology through licensing to global network of battery companies
• Delivering advantages in power & energy density, cycle life, weight & charge acceptance
• Leveraging proven low cost materials taken from solar energy industry
• Now in commercialization with global industry leaders
THANK YOU!