LithSonic™ : Powering the next battery revolution

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Battery technology has transformed almost every aspect of our lives, from transport to mobile technology to storage of renewable energy. The leading battery technology, lithium-ion, was developed nearly 40 years ago in the 1980s and, despite phenomenal progress, it is now reaching its limits in terms of energy density and reliance on expensive metals, e.g. Ni and Co.

To continue the exponential advances brought about by batteries, we need new battery chemistries that can move us to a post-lithium ion era. The most promising next-generation battery chemistries in terms of energy density[1] are lithium-metal anode LIBs, Li-S, and Li-air, and Li-S and Li-air also eliminate the need for Ni and Co. All of these chemistries rely on the abundant and affordable supply of lithium metal.

Unfortunately, current global production of lithium metal is small (4-5 ktpa), the cost is prohibitively high (>US$100,000 / tonne), and the electrolytic production process is antiquated and environmentally unfriendly. A lithium-metal battery future needs a paradigm shift in lithium metal production.

LithSonic™ is a revolutionary technology to produce lithium metal at low cost in an environmentally friendly way. The process uses a carbothermal reduction to generate lithium metal vapour, which is accelerated to velocities of 1000-1500 m/s through expansion in a supersonic nozzle. This results in quenching at >1,000,000 °C/s and produces a fine metal powder. Preliminary estimates indicate production costs of less than half the existing technology without the release of toxic chlorine gas, as currently occurs in the electrolytic process. Capital cost is also expected to be significantly lower.

We present the results of recent experimental work with the LithSonic™ process, outlining the physical and chemical properties of the lithium metal product, and provide a techno-economic comparison to the existing technology.

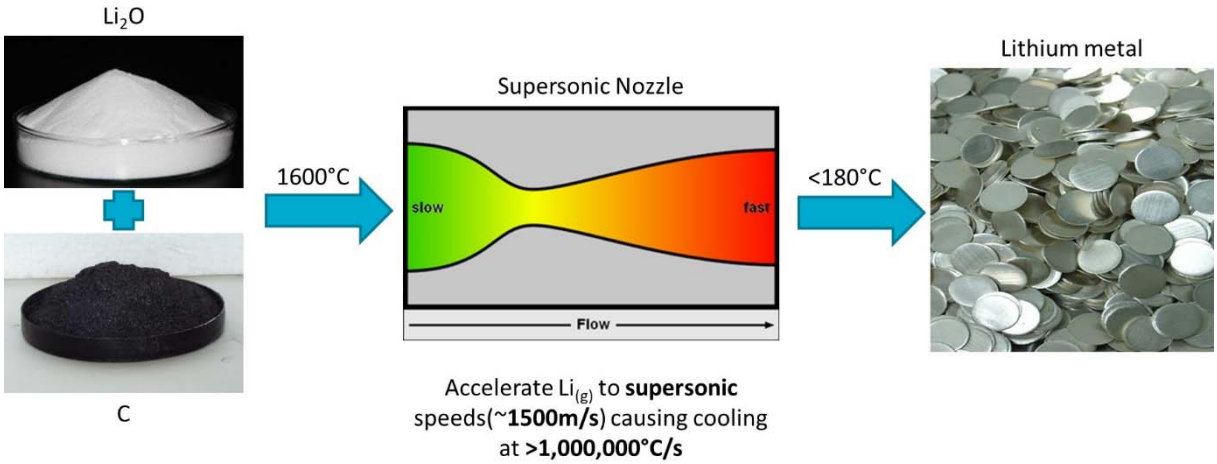

Figure 1. Overview of the LithSonic™ Process

References:

[1] C-X. Zu, and H. Li, Energy Environ. Sci., (2011), 4, 2614-2624