

# **Advances of Lithium-ion Battery Technology in the 21<sup>st</sup> Century**

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Lithium-ion battery has achieved commercial success after about 1/4 century development and is expected to continue rapid growth, which is projected to reach about \$50 billion by 2022. The smart electronic devices powered by lithium-ion battery have made people life better; amid the limited fossil fuel resources and burgeoning environmental concerns, rapid momentum has been gained for lithium-ion battery in vehicular applications and large-scale energy storage emerge. Improved safety, higher energy density, higher power performance, extended cycle life and lower cost are among the pursued top list. Currently, cell phone battery has reached ~700 Wh/l volumetric energy density; the technology breakthrough is required to break the current glass ceiling for such level of energy density: new chemistry rather than intercalation based layered graphite, such as Si and lithium metal; high voltage and high packed density of lithium cobalt dioxides above ~4.45 V. Fundamental understanding is desirable to guide the design of the material. High temperature performance is one of the most desirable for lithium-ion battery. Graphene assisted high-temperature lithium-ion battery technology will be discussed.