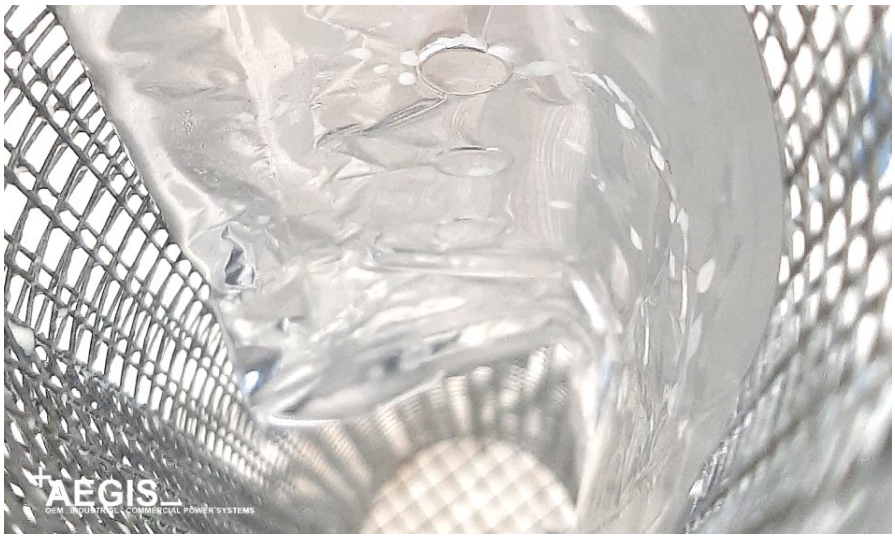
Technical Development and Services in Aegis Battery

In addition to the manufacturing and distribution of our industry-leading Li-ion rechargeable batteries and various related energy/power products, Aegis Energies Inc. has also actively engaged in continual research, development ,and commercialize cutting edge technology into commercially available products whose benefits all consumers can enjoy. Over last few years, we have carried out research and development in the: (1) Advanced electrode materials of Li-ion batteries and the resultant battery cells; (2) High-power, high-energy, high-safety Li-ion battery cells and packs for vehicle applications and energy storage applications; (3) Solid-state Li-ion batteries; (4) Hybrid Supercapacitor-Battery Device/System; and (5) Re-purpose/Re-cycle Battery.

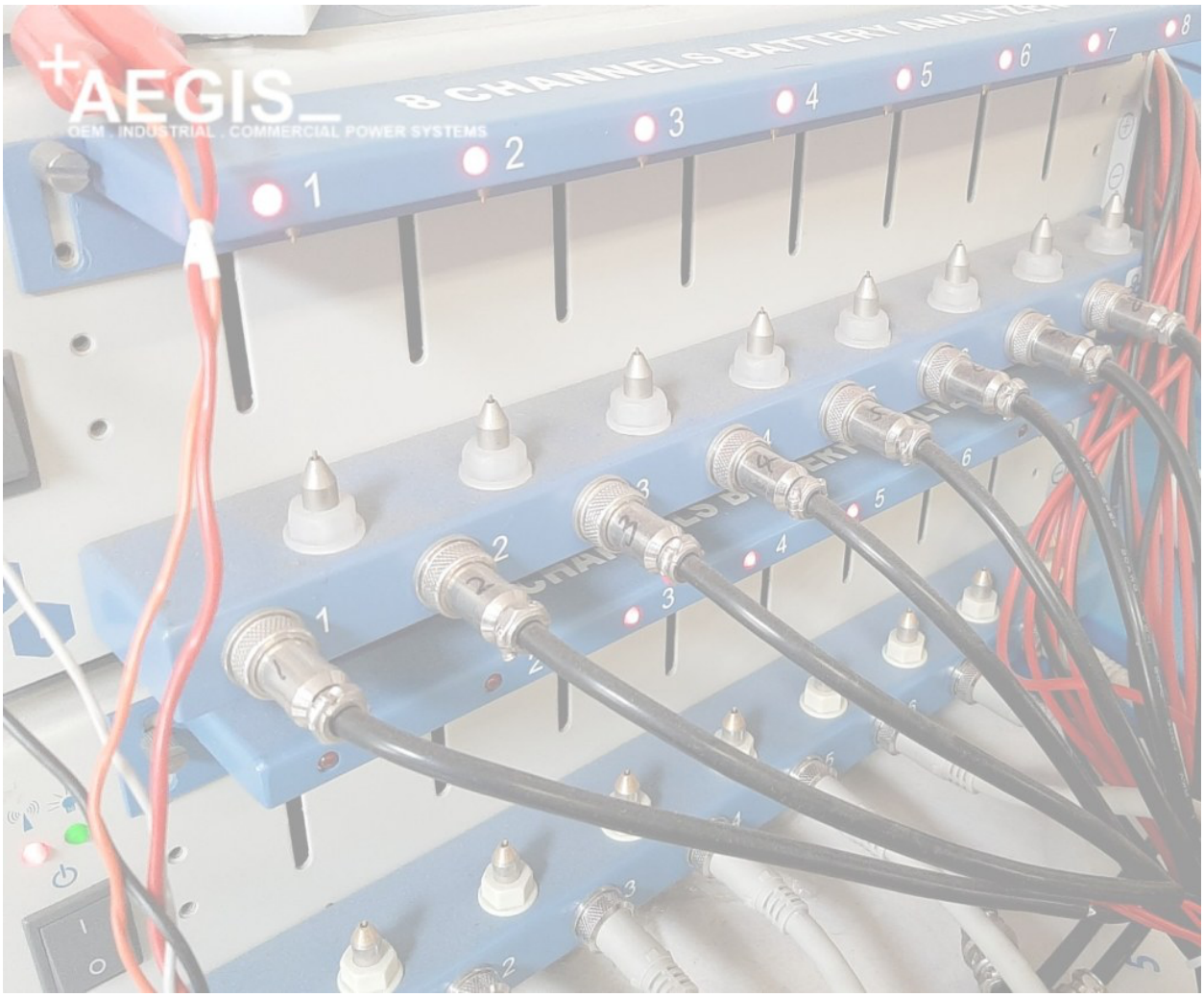


Technical Services

Aegis Battery offers cost-effective, comprehensive service of material/cell development, and the associated microstructural examinations and electrochemical property characterization to its customers including small businesses, national laboratories, universities, and large corporations. Its manufacturing capabilities provide these services to produce custom-designed electrode materials, battery cells, and battery packs in a flexible quantity.

Over recent years Aegis has provided a variety of electrochemical testing services for lithium-ion coin cell and pouch cell fabrication and performance testing to evaluate materials' characteristics at the cell level. Electrode/cell fabrications include the selection of active material loading, coating thickness, binder type (aqueous/non-aqueous) and content and current collector.

Testing services include: (1) Voltage profile; (2) Charge and discharge cycling; (3) Rate capability; (4) Cyclic voltammetry (CV); (5) Cell testing at different temperatures (-40°C to +90°C); and (6) Cell failure analysis.



Research & Development

We are currently researching nanostructured electrode materials which would lead to the production of high-energy-density, long-service-life battery cells and not only as a stand-alone product but also as a basis for other more complex energy storage systems. The electrode materials used includes stabilized NCM materials and of Si-based nanocomposites. We have also developed a novel class of high-power, high-energy, and high-safety battery packs (in both 6T form and Group 31) for vehicles applications. This class of LiFePO4 based battery pack is equipped with proprietary thermal management and protection circuit module (PCM) and thus provides much enhanced safety, reliability and thermal stability. The battery systems having been investigated also include those for energy storage and electric vehicles.

Aegis Battery specializes in developing nanotechnology-based new generation of nanotechnology-based electrode materials including new compositions, new particle morphologies, new process development, process scale-up, and modification of existing materials (particle size, morphology, tap density, & surface area). We produce battery materials through our scalable and economical solid state synthesis process, which is adaptable to different materials compositions and particle morphologies, with a focus on anode and cathode materials.

Anode materials are the negative electrode in lithium-ion batteries and are paired with cathode materials in a lithium-ion cell. The anode materials in lithium-ion cells act as the host where they reversibly allow lithium-ion intercalation/deintercallation in the course of charge/discharge cycles. General criteria for selection of suitable intercalation-based anode materials include (1) low first cycle irreversible loss, (2) high coulombic efficiency, (3) fast lithium-ion diffusion into and out of the anode, (4) high ionic and electronic conductivity, (5) minimum structural changes upon charge and discharge, (6) high specific capacity (mAh/g), and (7) the ability to form and maintain a stable SEI (Solid Electrolyte Interface) layer upon cycling. In addition to standard anode materials,

we can also provide customized anode materials based on the customer’s needs including Lithium Titanium Oxide (LTO,Li4Ti5O12) that is an electrode material with exceptional electrochemical stability, often used as the anode in lithium-ion batteries for applications that require high rate, long cycle life, and high efficiency. LTO-based batteries are considered safer and have a wider operating temperature range.