

Pleione Energy S. A

Patriarchou Grigoriou & Neapoleos Str.,
NCSR DEMOKRITOS,
New Science & Technology Park of Attica
"Lefkippos",
15310, Agia Paraskevi, Attiki, Greece



<http://www.pleione-energy.com>
Tel : +30 210 6564501

Pleione Energy S.A is an International Joint Venture between the Greek company ADAMANT COMPOSITES LTD (founded 2012) and the German company OMNIDEA-RTG GmbH (founded 2014). The company was established in 2015 and is since based at the Technology incubator of the National Center for Scientific Research (NCSR) "Demokritos" in Athens, Greece. The Vision of Pleione Energy is to grow its position as an innovative company that develops and provides technological excellent applications for the energy and space sector. The main goal is to identify and synthesize leading edge technologies to industrial applications and products, maximizing their exploitation potential.

Currently, the company focuses on the development, design and production of cost-effective products and applications for energy conversion, distribution and storage using enabling graphene technologies. The primary application field is the design and development of advanced storage systems through application of nanotechnology in batteries, capacitors, fuel cells etc. Advanced materials and nanotechnology expertise, along with extensive research experience in the energy and aerospace sector, empowers the team behind the company to achieve technological breakthroughs.

Pleione Energy S.A through its participation in several industrial projects of the European Space Agency (ESA) has developed two innovative nano-enabled based energy storage systems. Currently both products have reached pre-commercial level having a working prototype in place.

1. Graphene based lithium battery and supercapacitors electrodes
2. Graphene based lithium battery and supercapacitors cells

Graphene has the potential to deliver the next generation batteries and supercapacitors, with improved performance, durability and safety at an acceptable cost. Through these activities, PLEIONE has developed engineering and technical capabilities to address a range of challenges dealing with design, analysis and manufacturing of graphene-based electrodes and cells.

For the development of graphene cell, an appropriate in-house pilot line has been established, where all the critical manufacturing parameters are carefully controlled and optimized. More specifically, the company has established an **end-to-end pilot line** for the development of electrochemical energy storage devices (batteries, supercapacitors etc.). Pleione has the capability through the application of graphene and other nanomaterials to develop innovative electrodes for energy storage applications in all aspects of the necessary process, from the design of the electrode formulation and the preparation of the nanomaterial slurry and the coating of the electrode with tape casting process to the preparation of the pouch cell and the related testing.

In terms of processing, Pleione has all the necessary tools that are related to the nanomaterial handling in powder form as also has established the processes for the formation of electrodes. Also, Pleione has established manual and semi-automatic tape-casting processes for the formation of the coating and the related processes for the post-processing of the electrodes and their preparation for integration to pouch cells. Finally, Pleione has the capability of producing pouch cells in various dimensions in inert atmosphere as also the capability of forming half-cells for material research and development purposes. The testing capabilities of

Pleione Energy S. A

Patriarchou Grigoriou & Neapoleos Str.,
NCSR DEMOKRITOS,
New Science & Technology Park of Attica
"Lefkippos",
15310, Agia Paraskevi, Attiki, Greece



<http://www.pleione-energy.com>
Tel : +30 210 6564501

Pleione cover the full characterization of an electrochemical device, in material level as also in cell level, from high analytical testing through potentiostatic and galvanostatic processes to high duration performance testing such as life cycle tests.

Pleione through the experience gained over the last years has also established quality and product assurance protocols that monitor and test the production processes in order to ensure the successful development of materials and devices. Below Pleione's capabilities are listed in detail:

Capabilities	Features
<ul style="list-style-type: none"> ✓ Innovative Electrode formulation development using nanomaterials ✓ Electrode formation and coating (film applicator) ✓ Sample preparation of battery and supercapacitor electrodes and cells for electrochemical testing ✓ Battery and supercapacitor half-cell and pouch cell design, manufacturing & characterization ✓ Electrochemical testing (cyclic voltammetry, impedance spectroscopy, charge/discharge etc.) of provided electrodes & cells ✓ Battery and supercapacitor module assembly ✓ Battery and supercapacitor cell activation and testing ✓ Performance (capacity, open-circuit voltage, self-discharge, resistance) and aging (life cycle) evaluation of battery and supercapacitor cells ✓ Pilot line access and integration of techniques and GHz-electrical hardware instruments for in-line measurements 	<ul style="list-style-type: none"> ✓ Ultrasonic homogenizer for active material dispersion and slurry preparation (Hielscher, UP400ST, Max. power 400 W, 24 kHz) ✓ Semi-Automatic Active Paste Coating Device with vacuum table and temperature control ✓ Hot Rolling Press Machine for electrode thickness adjustment (Xiamen Lith Machine Ltd, LITH-JS300, 300mm width, max. temp. 130°C) ✓ Glove box with 2 gloves and HEPA filter (ITECO, SG20) for nanoparticle powder handling ✓ Vacuum oven with temperature control (MTI Corp., Max. Temp. 200 °C) for drying of the produced electrodes ✓ Inert atm. Glove-box (MTI Corp., Compact Stainless-Steel Vacuum Glove Box) for cell assembly ✓ Ultrasonic tab welder (T-MAX, Freq. 24 KHz, Max. Power 2 KW, for welding of metal terminal of the cell) ✓ Pouch cell sealing machine, to seal the developed pouch cells under vacuum ✓ 8-channel MTI Corp Battery Analyzer (0-5 V, 0-5 A) ✓ Potentiostat/Galvanostat Autolab PGSTAT204 (-10 – 10 V, 10nA to 100 mA) with EIS module FRA32M (10μHz – 32MHz)