

### Company Overview

NanoHydroChem is an advanced materials company developing and commercializing nanomaterials for the next generation of energy storage applications.

### Problem

Li-ion batteries are still using thirty-year-old technology. These iconic technologies are nearing end-of-life usefulness even as we create ever more exciting ways to use more energy. New battery materials are needed to increase the performance of batteries to meet future needs without significant changes in manufacturing processes. Furthermore, it is critical to move beyond the current battery materials such as nickel, cobalt, and magnesium due to supply chain and cost challenges. It is time to use the most abundant elements on the earth with mature manufacturing processes to commercialize the next generation of Li-ion batteries.

### Solution

NanoHydroChem aims to commercialize silicon-dominant anode and iron-based cathode materials. Combined together, these new battery materials increase the energy density (Wh/kg) by 100% and decrease the cost to \$50/kWh. These goals will be achieved by using highly abundant, safe, and low-cost silicon and iron, which could be sourced anywhere globally. We employ highly scalable, well-established, and cost-effective processes to produce the materials at scale. Our integrated anode-cathode synthesis processes enable low cost, minimum environmental impacts, and reduced manufacturing footprint. The battery materials are 100% drop-in replacement in the current high-volume Li-ion cell production infrastructure.

- **+ 100% higher energy storage** – eliminating range anxiety found in current batteries.
- **Fast charge capability** – unlike graphite, silicon is capable of extreme-fast-charging.
- **Greater cyclability** – nanostructures minimize degradation due to recharge cycles.
- **High safety** – porous structure minimizes cell-level volume expansion. The oxygen element (an oxidant) in the iron-based cathode is eliminated.
- **Low-cost and drop-in production** – well-established and integrated manufacturing processes and low-cost raw materials.
- **Global sourcing** – silicon and iron are the earth's most abundant elements with mature supply chains.

### Market Size

According to a report released by Lux Research, the total energy storage market is expected to exceed \$546 billion in annual revenue by 2035. Increased electric mobility demand drives expected 10X revenue growth. NanoHydroChem's ultimate vision is to enter the electric vehicle and aircraft markets. Our current focus is to validate the technology in smaller strategic markets.

### Business Model

Initially, we will enter the market in collaboration with the current cell manufacturers. Our ultimate vision is to manufacture the Li-ion cells in our own Gigafactory and sell directly to OEMs. We aim to release three generations of Li-ion cells based on our materials:

- **First generation:** Silicon-dominant anode and commercial cathodes (NMC & LFP).
- **Second generation:** Silicon-dominant anode and Iron-based cathode.
- **Third generation:** Second generation materials in all-solid-state format.

### Competition

Our primary competitors in the anode space are Enevate, Sila Nano, Enovix, and Amprius. To the best of our knowledge, we do not have any competitors in the next generation of iron-based cathode materials. Furthermore, no other company can produce the anode and cathode materials in an integrated process. Combining performance and large-scale production feasibility is the key. We believe NanoHydroChem can provide both.

### Milestones

- Received a \$200K grant from NYSERDA.
- Received a \$63K grant from University at Buffalo Innovation Hub.
- Successfully scaled up the lab-scale process.
- Obtained promising preliminary full-cell electrochemical data in coin cell format
- Exclusive rights to the IP. Filed for international patents
- Awarded a \$200K grant from the Department of Energy's Vehicle Technologies Office. Starting summer 2022.

### Team

- **Parham Rohani**, Ph.D., CEO and Co-founder.
- **Mark T. Swihart**, Ph.D., CSO and Co-founder. Department Chair, Chemical and Biological Engineering and UB Distinguished Professor at the State University of New York at Buffalo.
- Several technical and business advisors.

### Ask

We are currently raising pre-seed capital of \$1M and seed capital of \$5M. We will use the investments to add eight personnel to our team and upgrade some of our equipment. We will scale up our synthesis process, develop our MVP and demonstrate the electrochemical performance of the battery materials in pouch cell formats. Furthermore, we will design our pilot line and prepare the company for A round investment.