

NOPO NANOTECHNOLOGIES

HIPCO® SINGLE WALLED CARBON NANOTUBE

- **Legal Name:** NoPo Nanotechnologies India Private Limited
- **Amount of Capital raised**
 - **Equity:** 1.75 Crores
 - **Grants:** 2.00 Crores
 - **Debt** : 0.55 Crores
- **Monthly Burn:** Current : ₹4.5 Lakh
- **Full-time employees:** 12
- **Advisors / Investors:**
 - Advisor - HiPCO Dr.Robert Kelley Bradley(Co-Founder), Dr.Sivaram Arepalli (NASA, Rice University), Dr. Andrew Barron (Swansea University)
 - Advisor - Water Dr.T N V V Rao (Former R&D Head, Eureka Forbes)
 - Advisor – Composite Dr. O P Bahl (Former Director, National Physical Lab – New Delhi)
 - Advisor – Hardware Dr. V Jayaram (SSCU, IISc), Mohan Kumar K J (Srushti Automations)
 - Advisor – Regulatory Mr. Kiran C V (NLSIU)
 - Advisor – Legal Mr. P. Changalaraya Reddy (M.Com LLb) (Deshraj & P.C.Reddy)
 - Advisor – Strategy Dr. Rajat Rakkhit (NASA, AMD, Cypress Semiconductor)
 - Investors Friends & Family
- **Location:** RMVP+P42, Bengaluru, India
- **Website:** <https://www.noponano.com>

BUSINESS SUMMARY

- **Description:** HiPCO® Single Walled Carbon Nanotubes are tiny tubes; 200,000x smaller than a hair strand. They exhibit very high strength, semi-conductivity, fast water transport and high conductivity. The material was discovered 30 years ago and has proven itself in laboratories. We have solved the problem of manufacturing consistently at an industrial scale. Our customers say that we make the finest nanotubes; as attested by peer-reviewed articles in leading journals. Our HiPCO® are considered benchmark Nanotubes and have been used for a wide range of studies. We have found marquee customers Tesla, TSMC and Lockheed Martin to use the material in their products.

We identified >150 applications in diverse markets ranging from Water filtration, batteries, Space, defense to electronics. Water filtration has emerged as our beachhead market. Carbon Nanotube membranes have the ability to extract clean water from any contaminated source. This technology is the need of the hour for >3B people in earth and space. With grants and support from the Government of Karnataka, Government of India, Department of Science, Ministry of Defense, Indian Navy, Niti Ayog, TATA Trusts and Atal Innovation Mission; we have developed HiPCO® membranes. They outperform existing wastewater membranes by 4x. They have potential for a further 100x improvement in performance. The disruptive membranes are being tested by multiple partners, customers. We are now scaling up production of HiPCO® to meet all these requirements.

- **Business Model:**
 - Sale of HiPCO® membranes,
 - Sale of HiPCO® Carbon Nanotube
- **Vision:** Ushering in the Carbon age using HiPCO® Carbon Nanotube

TEAM

- Gadhadar Reddy Founder, CEO
- Anto Godwin COO
- Sreekanth P Scientist
- Renjini Ganesh Scientist
- Aakib Memon Engineer
- Eldho Kurien Engineer

- Sharon Engineer
- Vivek C Chief Evangelist

- **Founders have known each other since:** Gadhadar Reddy and Dr. Bradley met 11 year ago. Gadhadar and Anto have worked together for 6 years.
- **Equity Sharing Arrangement:** Gadhadar Reddy: 61%, Dr. Robert Kelley Bradley: 6%, Changalaraya Reddy: 18 %, Angel Investors: 15%

CUSTOMER PROBLEM / NEED

- **Key Customer Problem/Need:**
Single Walled Carbon Nanotubes are essential for Water membranes, Battery Electrodes, Electronic transistors, spacecraft composites etc. The material available is inconsistent and expensive. HiPCO® technology has solved this.
The biggest manufacturer of Single Walled Carbon Nanotube is a Russia backed company; OCSiAl. Customers want an alternate source due to the ongoing conflict.

PRODUCT OR SERVICE OFFERING

- HiPCO® Single Walled Carbon Nanotube
 - HiPCO® Membrane
- Brand names:** HiPCO®

TARGET MARKET

- Water Filtration
- **Reason for choosing target market:** Water is the biggest problem on Earth affecting >3B people. Most of our clean water sources are polluted by human activities. HiPCO membranes have a theoretical performance up to 100x better than any known technology. They can extract clean water from any contaminated source. Techniques developed for water filtration using Nanotubes create material that is suitable for entering parallel markets such as Batteries and Electronics.
- **Market Size:** US\$ 22.6 Billion for Nanotubes

GO-TO-MARKET STRATEGY

- **Current Marketing Plan:** In person meetings with large clients
- **Current Distribution Plan:** Direct sales and through distributors Nanointegris Inc. (USA & Canada), New Metals Corporation (Japan), Ad-Nanotech (Middle-East)

REVENUE MODEL AND FINANCIAL PROJECTION

- **Revenue Model:** Sales of HiPCO® Membranes and HiPCO® Carbon Nanotubes used to make Membranes.
- **Expected Growth:** According to Market Research Reports, a combined 26% CAGR is expected for the Nanotube market till 2032.
- **Pilot Test Experience:**
 - Tests with ROCHEM have shown dramatic improvements in performance
 - Tests with ISRO have shown performance and qualified for space use
 - Tests with Indian Navy are ongoing
 - Customers have expressed satisfaction with the quality of Nanotubes
 - Japanese AIST and USA's Rice University rank the material as superior to other Nanotubes
 - Tests with TSMC and Tesla will start shortly

COMPETITIVE ADVANTAGE AND COMPETITIVE LANDSCAPE

- **Competition:** OCSiAl, Chasm Technologies, Meijo, Thomas Swann, Southwest Nanotechnologies, Arkema, Sun Nano, Nanocyl
- **Entry Barriers:**
 - HiPCO® Single Wall Carbon Nanotube technology is held as a Trade Secret
 - Multiple patents on Purification of Nanotubes

- Nanotubes suitable for Applications have a diameter of 1nm. Competitor material is >1.4nm
 - Process to produce Catalyst used in HiPCO® process is patented
 - **Competitive Advantage:**
 - HiPCO® Carbon Nanotubes are the most widely studied with >12,700 publications to date.
 - Biggest competitor is held by Russian Oligarch. The ongoing conflict with Ukraine is driving customers towards us.
 - Focus on Single Walled Carbon Nanotube. Most competitors are diversified and spread thin.
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TECHNICAL INNOVATION

- Scale-Up: successful development of the technology from idea to market ready over the last 11 years.
 - NoPo HiPCO® is the only reactor designed to work continuously under extremely corrosive environments. The critical components of the system are held as a trade secret.
 - The system uses Iron Pentacarbonyl as a catalyst. In order to increase safety and achieve scale-up; we developed and patented an on-the-fly catalyst generator. This allows for the catalyst to be stored and used with a high safety margin.
 - NoPo has developed a Chemiluminescence detector in collaboration with University of Colorado for detection of Metal Carbonyls in Part Per Billion levels within 3 seconds. The state of art commercial technology took 30 minutes for the same detection.
 - The team has developed expertise in Pressure Vessels, Heating technologies, Vacuum Systems, Cryogenics, High Power feedthroughs, Heat exchangers, Nanoparticle filtration, CO₂ filtration, Control Systems and Automation
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IMPACT

- HiPCO® allows for development of products that are impossible with naturally occurring materials.
 - HiPCO® Carbon Nanotubes improve battery performance up to 10x and reduce incidence of fires.
 - HiPCO® Membranes are a solution to the water crisis. They provide an affordable water treatment system to provide clean water from any source to over 4 Billion people.
 - Electronic Circuits made using HiPCO® have an energy density that is 100x higher than incumbent. Higher compute power will improve people's lives with smarter systems.
 - Coatings and inks made with HiPCO® improve electronic performance of composites.
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TRACTION

- **Technology:** HiPCO® are known as the benchmark Carbon nanotubes due to their high quality and consistency. We've won several awards, recognitions for creating the Nanotube production process.
 - 2022: Guadalupe Workshop Speaker
 - 2021: Top 5 Carbon Nanotube manufacturer on Earth
 - 2020: Winner: Global Startup Challenge (Hong Kong) – Global 1st Runner Up, Bangalore Winner
 - 2019: MOU with Lockheed Martin for HiPCO® Carbon Nanotubes in Aircraft Composites
 - 2019: Winner of inaugural IDEX DISC-1 (Indian Navy) grant for HiPCO® Nanotubes in Submarines
 - 2019: Featured in CNBC TV 18, BBC, Entrepreneur Way
 - 2019: PwC-FICCI LevelNXT Winner
 - 2019: AGNii AIM Winner
 - 2018: Showcase of Nanotubes to President of India
 - 2017: Karnataka State Elevate 100 Winner
 - 2017: Work with ISRO for Development of Super Black Coatings for potential use on Mangalyan-2
 - 2017: Lockheed Martin - DST - Tata Trusts IIGP 2.0 Winner: India's Top 5 Innovative Tech Startup
 - 2016: EO CARES Top 3 Technology Startup of Bangalore
 - 2015: Winner of 4th International Space Power Competition
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CONTACT DETAILS

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