



# Bi-Annual Report

Sept 2020 – August 2022

# A Message from the Director



The Spark Innovation Center's mission is to support early-stage tech businesses and drive adoption of their technologies in Tennessee and throughout the world. We also strive to create meaningful and measurable impacts on the communities where we serve. To observe and understand those impacts, we thought it best to provide a summary of our activities, companies and impacts over the two-year period since our launch.

In our **incubator** program, Spark provides laboratory and office space, and expert mentoring and programming, to grow selected tech companies. In our **accelerator** program, the focus is on intense programming to build real "commercializable and investible" businesses over a 12-week program. Our intent with both programs is to

strategically connect local partners with cohort members, and ultimately locate them in Knoxville.

As a builder of businesses, the Spark Innovation Center has delivered some impressive results, as you'll see in this report, and our impacts in terms of funding and new jobs are remarkable. These impacts are the result of Spark:

- Focusing on recruiting and supporting companies with what they need - the right space and the right programming at an equity-free, affordable price
- Assembling and managing a team that is experienced, skilled, works together well and executes on plan
- Connecting our companies with resources right here, in our local community, and in return our entire program contributes to building the community
- Supporting the development of real-world investible and commercialized companies

Spark is poised to not only continue this mission but GROW along with active cohort companies and alumni.

And we need your help - with funding, mentors, and opportunities to collaborate and do great work together. We have been fortunate to receive initial funding from several resources, but it's not enough. We have a fabulous team, facility and group of companies that it are truly an honor to work with. But as we continue to grow, improve, and even plan our own facility, meeting our future costs is a challenge.

This is where exciting current and future Tennessee and American businesses are being built, and we welcome you to learn more and hopefully help us advance the Spark mission. Thank you for your time, interest, and continuing support of the Spark Innovation Center.

A handwritten signature in blue ink, appearing to read "Jim Fuchs".

Director, Spark Innovation Center



# The Spark Team



**John Bruck**

Director  
Spark Innovation Center



**Carol Seamons**

Director of Engagement  
Spark Innovation Center



**Tom Rogers**

President & CEO  
UT Research Park



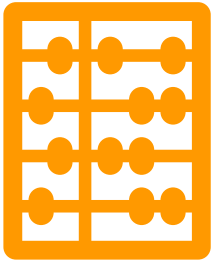
**Angelee Day**

Chief Operating Officer  
UT Research Park



**Courtney Piper**

Executive Director  
TN Advanced Energy  
Business Council



# By the Numbers

## September 2020 – August 2022

### Total Funding Acquired

\$ 18.0 Million Grants (non-dilutive)

\$ 15.6 Million Equity Investments

\$ 1.2 Million Recurring Revenue

Total \$34.8 Million

### Jobs Created

26 Total Full-Time Employees

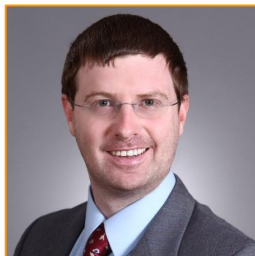
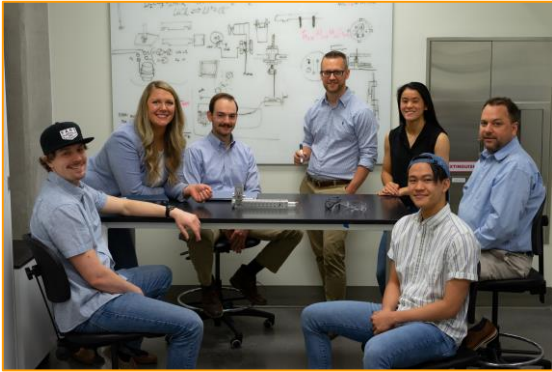
10 Contract Employees

10 Internships Supported





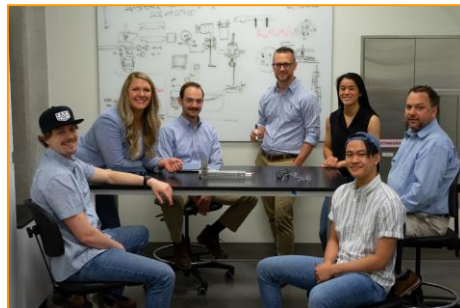
# Highlighted Spark Incubator Companies





***SkyNano** has developed a novel technology that offers permanent storage of CO2 emissions into solid carbon materials used as inputs into materials and devices needed every day by consumers.*

- Secured a Joint Development Agreement (JDA) to develop other carbon structures from our core technology, sold Multi Walled Carbon Nanotubes (MWCNTs) to 6+ customers
- Supplied a Carbon Nanotube (CNT)-enabled prototype to a customer through a collaboration with Endeavor Composites, a University of Tennessee-based startup
- Patent formally issued by United States Patent and Trademark Office (USPTO)
- Hired 3 full-time employees for a total of 8 full-time employees
- Kicked off a \$2.5 Million project in collaboration with Tennessee Valley Authority (TVA) and the National Renewable Energy Laboratory (NREL)
- Received 2 Small Business Innovation Research (SBIR) contracts from the United States Air Force (USAF) for a total of \$2.5 Million
- Received a \$1 Million National Science Foundation (NSF) Small Business Innovation Research (SBIR) Phase II Award
- Received a \$2M Small Business Technology Transfer (STTR) Award from the Advanced Research Projects Agency-Energy (ARPA-E) to collaborate with Endeavor Composites and University of Tennessee-Knoxville (UTK)
- Scaled up our production 40X and improved post-growth processing
- Crossed a significant milestone – raised > \$10 Million in total NON-dilutional funding!
- Recognized as a top 60 finalist for the \$100 Million Elon Musk XPrize
- Received the 2022 Governor's Award for Environmental Stewardship (Air)
- Built out and moved into our own commercial laboratory space in **Knoxville**.





***Eonix** rapidly designs new chemistries, including non-flammable electrolytes, from existing materials that drop right into batteries manufactured today*

- Awarded \$4.1 Million in Research & Development contracts
- Entered a 3-year collaboration with a multi-billion-dollar public company valued at \$15 Million
- Collaborated with University of Tennessee to hire 2 interns
- Hired one Part-Time employee
- Collaborating with University of Tennessee to occupy new engineering lab space 3X Spark
- Designed a non-flammable lithium-ion battery electrolyte
- Scaled a non-flammable lithium-ion battery prototype from 5mAh test cells to 1Ah commercial prototypes (200X increase)
- Demonstrated the safety of Non-Flammable Lithium-Ion battery technology to the Department of Defense and Grid Storage Customers
- Began development on additional lithium-ion battery product lines for Automotive and Consumer Electronics Markets with funding from the National Science Foundation
- On-track to engage in grid storage and military lithium-ion battery pilots in 2023





(formerly Active Energy Systems)

***Shift Thermal*** has developed a patented thermal storage system that shifts energy consumption to lower-cost renewable powered electricity.



- Hired 2 additional full-time engineers (for a total of 7 full-time employees in late 2022)
- Hired a University of Tennessee-Knoxville Chemical Engineering student for internship
- Re-branded company: Active Energy Systems now doing business as (DBA) Shift Thermal
- New website: [www.shiftthermal.com](http://www.shiftthermal.com)
- Total Grant Funding: \$3.2 Million
  - \$1 Million National Science Foundation (NSF) Small Business Innovation Research (SBIR) grant
  - \$1 Million Department of Energy (DOE) Small Business Innovation Research (SBIR) grant award
  - \$0.9 Million New York State Energy Research & Development Authority (NYSERDA) Program Opportunity Notice (PON) Award
  - \$300K Launch TN matching funds
- Private funding: \$600K via convertible note
- Filed second Patent Cooperation Treaty (PCT) application for heat exchanger technology
- First commercial-scale (100x lab scale) prototype designed, built and in the process of commissioning for subsequent testing
- Robust manufacturing and quality control processes have been and continue to be implemented, designed to meet any certification requirements that future pilots may need







American  
Nanotechnologies, Inc.

***American Nanotechnologies** is sorting and purifying nanoparticles, including carbon nanotubes, to produce semi-conductor materials*

- Awarded National Science Foundation (NSF) grant \$256K
- Carbon nanotube purification equipment (bench scale) procured, assembled and utilized
- Senior Research Materials Physicist promoted to Chief Technical Officer
- Collaborated with University of Tennessee Center for Materials Processing (4 undergraduate interns)
- Developed experimental methods to disperse and purify carbon nanotubes
- Characterized carbon nanotubes at Oak Ridge National lab





***Qubit** is developing quantum computing technology for renewable energy and electric grid challenges*



- Continued to improve quantum simulated solver for optimizing wind turbine placement for new projects, improving power production by 3-5%
- Qubit has contributed to the design of a total of 5 wind farms, 3 in Australia and 2 in Sweden. (~1.6 GW capacity)
- Qubit has expanded its wind layout optimization system to offshore projects
- Collaboration with co-founder and University of Tennessee Physics faculty
- A senior technical advisor has recently joined the Qubit team, to boost the performance of the optimization system
- New successful paid pilots with the largest renewable energy company in Europe
- Qubit is now collaborating with King Abdullah University of Science and Technology (KAUST)
- Developed services contracts/partnerships with major renewable energy producers based on successful demonstrations; **RES** (world's largest independent renewable energy producer) and five additional global companies in the renewable energy
- Developed supplier/subcontractor agreements and technical development partnerships with **Microsoft & QCI**



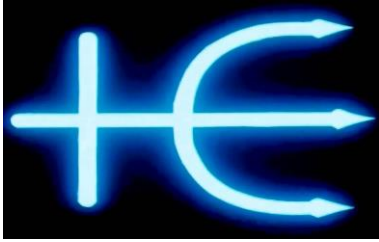


***CQ Insights*** uses data analytics systems science to transform the global healthcare system from one based on volume to one based on value for the patient



- Increased contracts with two active clients
- Added global top 5 medical device client
- Expanded to a dozen clinical sites
- Projected to hit \$1 Million Annual Recurring Revenue (ARR) 2023 1<sup>st</sup> Quarter
- Projected to grow to over 20 clinical sites 2023 1<sup>st</sup> Quarter
- In addition to 3 full-time founders, employ 10 part-time and contracted employees/partners
- Completed a Pediatric Urology project that has generated one international and two national scholarly abstract submissions and one international presentation
- Will bring the analysis of Pediatric Urology project to the Food and Drug Administration 2022 4<sup>th</sup> Quarter to request expanded indications for our client's product
- Projected to reach \$2 million of new business sales in 2023

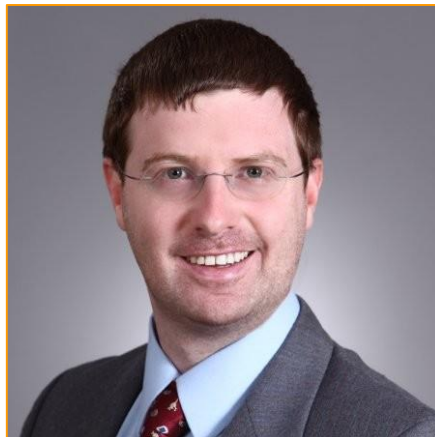




# Neptune Fluid Flow Systems

***Neptune Fluid Flow Systems*** create microfluidic connectors, sample reservoirs, pressure cells, manual plungers, and other accessory products.

- Graduated from Innovation Crossroads Cohort 3
- Awarded National Science Foundation (NSF) Small Business Innovation Research (SBIR) Phase I, \$200,000
- Awarded LaunchTN Small Business Innovation Research (SBIR) Matching Fund, \$100,000
- Two United States patents issued
- Completed National Science Foundation (NSF) Regional and National I-Corps Program, \$48,000
- \$100,000 Total Revenue (\$50,000 Annual Average)
- Hired one summer intern (Summer 2021)





# Spark Cleantech Accelerator

*An early-stage business accelerator that offers a comprehensive set of services to support promising cleantech technology companies*



[frakktal](#) (Houston, TX), founded by jhana porter, is developing an ag-waste process that produces sustainable finish materials (e.g., flooring) for use in built spaces



[Green Llama](#) (Johnson City, TN), co-founded by Kay Baker and Matt Keasey PhD, is reducing the environmental footprint of consumer cleaning products by producing eco-friendly cleaning materials and a sustainable packaging system



[Groundstar](#) (Cincinnati, OH), founded by Ed Chan, PhD, is developing a carbon capture technology focused on functionalized graphene for end-of-pipe use on emission sources

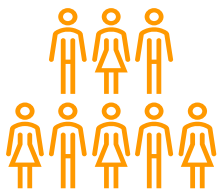


[RAEV](#) (Philadelphia, PA), founded by David Castley, is revolutionizing urban transportation with a system of small shareable electric vehicles



[Windfall](#) (Knoxville, TN), founded by Ryan Ginder PhD, has developed a system to recycle and recover high purity fiberglass from wind blades and automotive composite scrap





# Spark Incubator Cohort 2

## September 2022



**RAEV** is revolutionizing urban transportation with an optimized system of small shareable electric vehicles



**BECO** – is a materials engineering company producing high-performance radiation shielding solutions



**FC Renew** is developing a process to restore the catalyst of a degraded hydrogen fuel cell, without the need to dismantle or replace the fuel cell itself



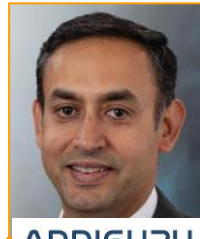
**Orion Therapeutics** is developing an mRNA delivery product for nucleic acid therapeutics and vaccines



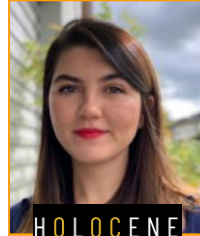
**Qubit** is developing quantum computing technology for renewable energy and electric grid challenges



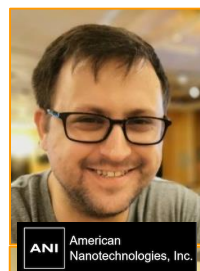
**Safire**'s patented Li-ion electrolyte additive stops explosion/fire through an instantaneous liquid-to-solid transformation upon mechanical impact, and imparts ballistic protection.



**Addiguru** provides in-situ monitoring technologies imaging and AI for additive manufacturing processes



**Holocene Climate Corporation** is developing a novel process of using organic chemistry for direct-air carbon capture



**American Nanotechnologies** is sorting and purifying nanoparticles, including carbon nanotubes, to produce semi-conductor materials





## Future Directions

- Hiring a Full-time Director of the Spark Cleantech Accelerator
- Strengthening mentor support through the Tennessee Energy Mentor Network (EMN), managed by TAEBC
- Deploying \$100,000 from the Truist Foundation to strengthen our commitment to diversity, equity, and inclusion
- Collaborating with the City of Knoxville to expand innovation and entrepreneurship throughout the city
- Recruiting and supporting 6 new companies in cohort 2 of Spark Cleantech Accelerator (Fall 2023)
- Leveraging Opportunity Appalachia grant to design and to develop a stand-alone Spark Innovation Center facility
- Establishing a Spark for Faculty pilot program designed to support faculty interested in commercializing their research
- Through 2024, we plan to support the launch of **40** new advanced energy, advanced materials, cleantech and healthcare companies

# A Special Thank You to...

## Our funding partners and key collaborators

City of Knoxville

University of Tennessee

Cherokee Farm Development  
Corporation

TAEBC Energy Mentor Network

Tennessee Valley Authority (TVA)

Piper Communications

LaunchTN

PYA

UT Institute of Advanced  
Materials & Manufacturing

Innovation Crossroads  
(ORNL)

US Department of Energy

## ...and our program contributors.

Heartland ClimateTech Partnership

Queen City Angels

Ashley Roccapriore, UT

Mike Halloran, Xavier

Red Stag

Egerton McAfee

Goodwin Procter

UT Center for Materials Processing

UT Oak Ridge Innovation Institute