DESTINATION STARTUP

Osazda Energy

One-Sentence Summary of What You Do: Osazda Energy's patented technology extends the operational lifetime of solar panels by reducing degradation due to cracking, which results in higher profitability for solar cell manufacturers and solar farm owners.

Affiliated Institution: University of New Mexico

Have you formed a company yet? Yes

Funding/Financing: Grant Funding, Angel Funding (including Self or Friends/Family)

Please describe your company and the problem you are trying to solve: Designed to operate for decades outdoors, solar panels are exposed to environmental stressors including wind, hail, extreme high and low temperatures, and heavy snow loads. Today's solar cells are thin by necessity but fragile, which leads to tiny cracks that form from manufacturing, shipping, installation, followed by decades of outdoor exposure to stresses. While cell cracks can be benign in the beginning of panel lifetime, cracks can worsen over time and severely decrease the power generation. Cracks in solar cells can decrease the power output anywhere from 1% and 43%, a significant loss of energy over the expected lifetime of a solar power plant. Solar panels are routinely warrantied to perform near their maximum power rating for 25+ years. Unfortunately, cracks in solar cells can create unnecessary warranty-related expenses for manufacturers and can decrease power production of a solar farm. Osazda Energy provides materials engineering solutions to improve solar panel durability, increasing profitability for solar cell manufacturers and solar farm owners. We have developed a unique, innovative, and cost-effective technology to address crack-related solar cell degradation and give cell cracks the ability to self-heal. Our patented metal matrix composite MetZilla Technology was created to help today's solar cells to be crack tolerant to manage major long-term degradation challenges for all solar panels. Our solution is a drop-in replacement for metallization processes used by solar cell manufacturers. Solar cell manufacturers who use our technology will increase the operational lifetime of their solar panels, distinguishing their products from others on the market.

What is/was your go-to-market strategy? For the past decade, the solar industry has grown at an annual average of 49%, and the number of solar panels deployed in the field has doubled every 29 months. In 2019, this market was valued at $52B. Nearly all solar cells require metallization, metallization is an electrical contact that extracts electricity from the solar cell for use. Today, over 90% of the solar cells on the market use silver paste metallizations, and all these cells are inherently fragile and subjected to harsh environmental stressors for decades. Osazda Energy provides solar cell manufacturers with specially engineered silver pastes to make their solar cells crack tolerant. In

2019, the silver paste market for photovoltaics was $3.8B and is expected to grow to $5.7B by 2026. Cell cracks are emerging as a major concern for solar farm owners and solar panel manufacturers as the extreme weather conditions, such as hailstorm and hurricanes, are becoming more frequent. However, there is currently no widespread adoption of solutions to mitigate crack-related damage. While other solutions do exist, they are not widely used. These other solutions (such as Meyer Burger's MultiWire Technology) require a costly change in the manufacturing process and equipment and introduce reliability risks from use of unproven materials. We are confident that we can solve the problem of crack-related degradation with our cost-effective and simple drop-in replacement technology. Our target market is the terrestrial photovoltaics market, but is our technology is also applicable to space, and unmanned aerial vehicle photovoltaics as well.

How will/do you generate revenue? Osazda Energy will engineer and formulate carbon nanotube enhanced MetZilla silver pastes for solar cell manufacturers. Solar cell manufacturers can use our MetZilla paste, using their existing screen-printing equipment and processes, making it an easy drop-in solution for solar cell cracking. Solar cell manufacturers who use MetZilla paste can increase their product's value to insurers, solar farm developers and owners by improving solar panel durability and lifetime power output at minimal cost ("bankability"), differentiating their products from others on the market. Furthermore, solar panel manufacturers and field insurers will avoid incurred costs from crack-related warranty claims. The seamless integration into the manufacturing process, low-cost, and durability of Osazda's MetZilla silver paste will help solar cell manufacturers distinguish their products from others on the market with nearly zero (less than 1¢/W) added cost. Our first products are in development. Our MetZilla silver paste formulations are embedded with specially functionalized carbon nanotubes. We will also develop processes for the recipes (printing/firing) for integrating our composite paste formulation (silver paste) on the customer's photovoltaic cells. Our growth strategy is to have a licensing agreement, in which we will exclusively license for a fee our technology to a large market participant (such as Jinko Solar, which deployed around 10% of solar panels worldwide in 2019) and receive a royalty on per volume basis.

How will this showcase benefit your company or technology? The idea for Osazda's technology came out of a collaboration with the Air Force Research Laboratory (AFRL) in 2017. AFRL reached out to Dr. Sang M. Han at the University of New Mexico and expressed a need for a solution to mitigate power degradation from cracked solar cells for their applications. Through this collaboration, our technology was developed. Since then, our team has successfully secured over $3M in non-dilutive funding for basic research and proof-of concept for our crack-tolerant metallization technologies. This funding has been crucial to the company's development process and has enabled the team to partner with several institutions for product development and validation. Until recently, Osazda Energy has been relying on existing commercial pastes as a base to add specially functionalized carbon nanotubes to demonstrate the technology. In order to commercialize our technology, we are currently working to develop our own in-house paste formulation that can be sold to our customers as a superior product at a cost point comparable to

other commercial pastes on the market today. From this showcase we are hoping to raise funds, develop strategic partnerships, and add additional team members. Specifically, we are seeking a $3.2M Series A investment. We will use this investment capital to move our operations out of the university laboratory and into a commercial manufacturing and demo space for our customers. Also, we are seeking to hire additional talent and develop partnerships with entities with manufacturing expertise to help us bring our product to market.

Who are the members of your team and why is this the right team to get the job done?

Osazda Energy was founded by Dr. S.M. Han and John Chavez through the New Mexico Start-Up Factory. The team has since grown to include an exceptional team of scientists, engineers, and business executives:

- John Chavez, Co-Founder, CEO, directs overall business strategy.
- Dr. Sang M. Han, Co-Founder, CTO & Lead Scientist, develops new metallization techniques and lean manufacturing processes for Osazda products. He manages the technical team and raises funding for scientific research to further understand how to improve Osazda's technology. Han has over 25 years of experience in semiconductor materials science and engineering and device fabrication.
- Andrea Garcia, Project Manager, leads the team in reaching key milestones. She is a company creation specialist for the New Mexico Start-Up Factory II.
- Dr. April M. Jeffries, Director of Business Development, engages with stakeholders to direct commercialization strategy. She is a photovoltaic specialist with a PhD in Materials Science and Engineering with 3 years of experience in commercialization of metallizations.
- Andre Chavez, Chief Engineer, PhD Candidate at the University of New Mexico, leads research and developmental efforts for the commercialization for Osazda's technology for the space and terrestrial photovoltaic markets.
- Brian Rummel, Chemical Engineer, formulates Osazda's paste and works to optimize mechanical and electrical properties. He is a PhD student at the University of New Mexico.
- Nicolas Dowdy, Chemical Engineering Intern, is pursuing his B.S in Chemical Engineering at the University of New Mexico. Nicolas uses his experience in chemical functionalization for inorganic materials and mechanical stress testing to optimize Osazda's products.