

---

NANO HARVEST X

# Engineering Energy Surfaces for Earth and Space

Nanomaterial-based surface architectures designed to improve energy generation across infrastructure systems.

---

Mehul Kumar | Dr. Santanu M. | Kamna Sagar | Dr. Nalin Sharma

Pre-Seed · 2026 | [www.nanoharvestx.com](http://www.nanoharvestx.com)

# Solar Loses Energy at Every Surface.

The surface is the bottleneck.

**~20%**

## Optical Losses

Reflection & spectrum mismatch waste harvestable photons before conversion begins

Wasted spectrum

**~12%**

## Thermal Losses

Heat degrades panel output in high-temperature climates — built-in and unavoidable

Accelerated decay

**~10%**

## Environmental

Dust, humidity, and climate reduce long-term asset efficiency and ROI

Sub-optimal ROI

**Billions m<sup>2</sup>**

## Passive Surfaces

Rooftops, towers, facades — vast existing infrastructure generating zero usable energy

Untapped scale

# The Industry Rebuilds Hardware. We Upgrade Surfaces.

INDUSTRY STANDARD	vs	NANOHarVESTx
⊗ Redesign the photovoltaic cell	vs	✓ Apply a surface coating layer <b>No new hardware</b>
⊗ Replace existing infrastructure	vs	✓ Deploy onto existing infrastructure <b>Instant addressability</b>
⊗ Capital-heavy, multi-year cycles	vs	✓ Fast deployment, low friction <b>Revenue without replacement</b>
⊗ Single optimization dimension	vs	✓ Photon + thermal + kinetic + env. <b>Integrated optimization</b>

*We optimize what surrounds energy systems — not the core hardware itself.*

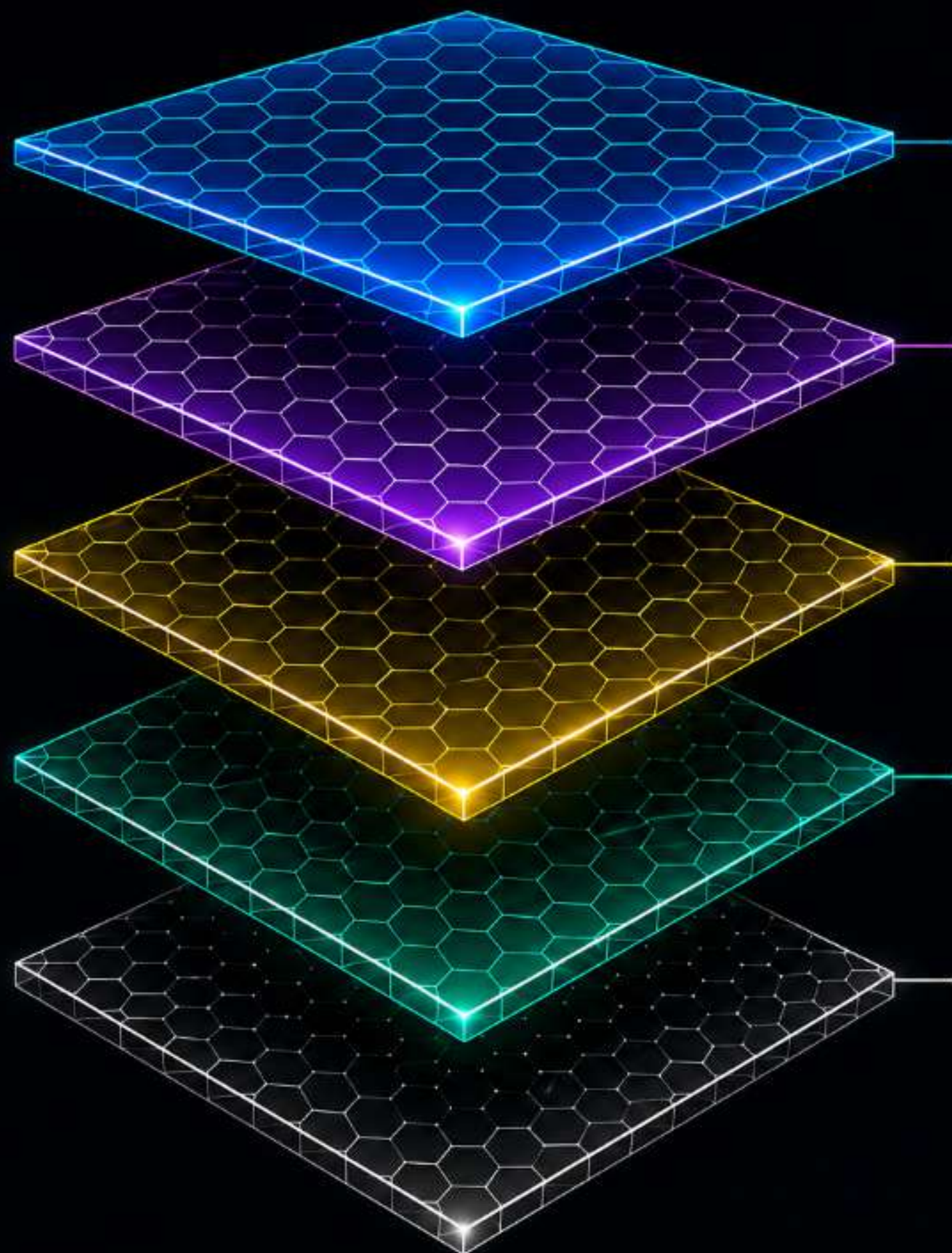
## CORE TECHNOLOGY

# SPAL

## Spectral Photon Amplification Layer

- **L1 • Anti-Reflection**  
Minimises reflection, maximises photon entry
- **L2 • Spectral Conversion**  
Converts high-energy unused wavelengths
- **L3 • Photon Trapping**  
Extends light path, increases absorption
- **L4 • Thermal Regulation**  
Manages heat, reduces thermal losses
- **L5 • Secondary Capture**  
Harvests kinetic, vibration & ambient energy

*Designed for retrofit across existing infrastructure.*



### L1. ANTI-REFLECTION LAYER

Minimizes reflection and maximizes photon entry.



### L2. SPECTRAL CONVERSION LAYER

Converts high-energy / unused wavelengths into usable spectrum.



### L3. PHOTON TRAPPING LAYER

Extends light path and increases photon absorption within the system.



### L4. THERMAL REGULATION LAYER

Manages heat, reduces thermal losses, and improves system efficiency.



### L5. SECONDARY ENERGY CAPTURE LAYER

Harvests kinetic, vibration, and ambient energy from the environment.

# The Breakthrough Is The Integrated Surface Architecture

01

## Coupled Photon + Thermal Optimization

Optical and thermal engineering in one system  
— no tradeoffs.

02

## Multi-Layer Surface Interactions

Interacting nanomaterial layers create  
compounding gains no single layer achieves.



03

## Retrofit-Compatible Design

Designed for deployment across existing  
infrastructure systems.

04

## Extreme-Environment Adaptability

One architecture across harsh terrestrial and  
future space environments.

PERFORMANCE

Modeled System-Level Yield Enhancement

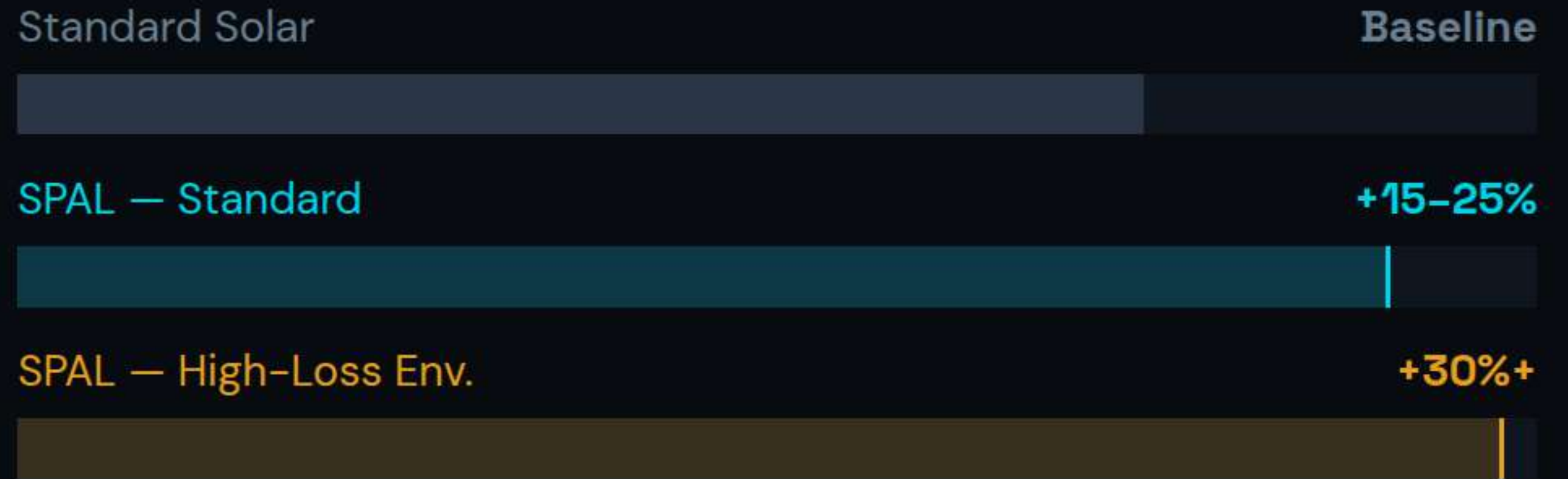
15-  
25%

Modeled yield improvement on initial deployment

30%+

Potential in high-loss thermal environments

YIELD COMPARISON



**\$240K-  
\$300K**

Added annual value  
per 10 MW installation

**1.5-3 yr**

Capital payback  
<1 yr in high-loss  
climates

**Zero**

New land needed  
Retrofits existing  
assets

*Performance targets based on modeled architecture behavior and phased prototype validation.*

# Why Now

**1.5 TW**

GLOBAL SOLAR  
INSTALLED

## Global Solar Expansion

Massive infrastructure growth creates unprecedented demand for yield optimization — without building new hardware.

01

**20–30%**

AVG YIELD GAP FROM  
SURFACE LOSSES

## Rising Efficiency Pressure

Operators need more output from the assets they already own. Replacing hardware is not the answer.

02

**2025**

NANOMATERIAL  
COMMERCIAL  
INFLECTION

## Nanomaterial Maturity

Manufacturing has reached commercial-scale viability — enabling cost-effective deployment of advanced harvesting layers.

03

**\$500B+**

EXTREME-ENV MARKET  
BY 2035

## Extreme- Environment Demand

Aerospace, defense, and harsh-climate deployments create a high-value, underserved market opening right now.

04

GO-TO-MARKET

# Solar Is The Commercialization Wedge India first.

## WHY SOLAR FIRST

**500+ GW**

**Global deployable solar fleet**  
Largest retrofittable market on Earth

**Day 1**

**Revenue from deployment**  
No hardware swap — coating applied directly

**~6 mo.**

**Validation cycle**  
Fast feedback loops for commercial proof

## WHY INDIA

**40°C+**

**Average operating temperature**  
India's heat = worst-case thermal loss test

**500 GW**

**India solar target by 2030**  
Rapidly scaling national infrastructure

**#3**

**World solar market**  
Cost-sensitive, high-rigor proving ground

MARKET OPPORTUNITY

# Massive Existing Infrastructure Base

TAM <b>\$1T+</b>	<b>Solar Infrastructure</b> Global energy systems
SAM <b>\$180B+</b>	<b>Built Infrastructure</b> Solar · Telecom · Commercial Roofing
SOM <b>\$1.5B</b>	<b>Entry Market</b> India solar fleet — beachhead first



*NanoHarvestX scales through existing infrastructure — not new hardware adoption cycles.*

# Platform Expansion Strategy

PHASE 1

2026-27

## Solar Validation

- SPAL prototype validation at IISc
- Solar pilot deployments
- EPC ecosystem partnerships
- Real-world performance datasets

### Solar commercialization wedge

Fastest path to real-world validation

PHASE 2

2027-28

## Infrastructure Expansion

- Telecom + rooftop infrastructure
- Commercial surface integrations
- Layered deployment architecture
- Regional deployment partnerships

### Infrastructure deployment scaling

Ecosystem-validated deployment scale

PHASE 3

2028-29

## Industrial + Extreme Environments

- Harsh-climate deployments
- Defense & industrial applications
- OEM-integrated SPAL architectures
- International infrastructure expansion

### Advanced infrastructure platform

Infrastructure-scale platform moat

PHASE 4

2029+

## Aerospace + Platform Licensing

- Orbital & aerospace pathways
- NASA / ISRO ecosystem opportunities
- Global licensing partnerships
- High-margin IP platform model

### Platform-scale recurring revenue

Venture-scale recurring revenue

# Revenue Evolution



**2026-27**

**Solar Validation**

- SPAL prototype dev at IISc
- Material validation
- Solar pilot prep
- Grant funding

**Pre-Revenue**  
Grant-supported

**2027-28**

**Solar Deployments**

- Pilot deployments begin
- EPC partnerships
- Commercial validation
- Performance datasets

**\$50K-250K**  
Pilot & deployment revenue

**2028-29**

**Infrastructure Expansion**

- Telecom + rooftop deploys
- Industrial pilots
- Regional partnerships
- OEM integration talks

**\$1M-5M**  
Infrastructure deployment revenue

**2029+**

**Industrial + Licensing**

- Licensing begins
- Harsh-environment programs
- International expansion
- Strategic mfg partnerships

**\$10M-25M**  
Licensing + recurring revenue

**LONG-TERM**

**Aerospace + Platform Scale**

- Global infra partnerships
- OEM-integrated SPAL
- Aerospace & defense
- High-margin IP licensing

**\$50M-100M+**  
Platform-scale recurring revenue

*NanoHarvestX scales through ecosystem partnerships and licensing — not hardware replacement cycles.*

# Why NanoHarvestX Is Defensible

Multi-layer complexity creates a compounding infrastructure moat.

## Coupled Multi-Layer Architecture 01

SPAL performance depends on interaction effects across optical, thermal, and environmental layers — not isolated materials. This complexity cannot be replicated by copying a single component.

## Proprietary Formulation + Deposition 02

Performance relies on nanocomposite formulation, layer sequencing, deposition behavior, and environmental tuning — an integrated process developed iteratively at IISc.

## Real-World Infrastructure Data 03

Pilot deployments generate environmental and performance datasets that continuously improve optimization models — creating a compounding data advantage unavailable to new entrants.

## Integrated IP Strategy 04

Patent filings cover architecture design, deployment methods, layer interactions, and adjacent implementation pathways — protecting the system, not just a single material.

*The moat is not a single material — it is the integrated energy-surface system.*

# Early Validation & Momentum

ACADEMIC NETWORK

• Active

## IISc • IITs • Finland

PARTNERS

3+ institutions

ACTIVITY

Prototype co-validation

CREDENTIAL

Institute of Eminence  
Fellow

- Q3 2026 — first co-validation

NASA  
ECOSYSTEM

• In  
Discussion

## Extreme-Env. Dialogue

PATHWAY

NASA-connected network

APPLICATION

Orbital & harsh-climate  
surfaces

ARCHITECTURE

SPAL discussed for  
extreme-environment  
applications

- Ongoing — defense-tech  
pathway ID'd

COMMERCIAL  
PIPELINE

• Forming

## India B2B Pilot Talks

TARGET

Solar farm operators in  
India

LEGAL

India & global  
incorporation underway

GOAL

Real-world yield  
optimization test

- Q4 2026 — first pilot target

# Leadership Team



**Mehul Kumar**

**Founder & CEO**

Cross-border deep-tech ecosystem building  
Infrastructure commercialization strategy  
Strategic partnerships & ecosystem scaling

[View Profile →](#)



**Dr. Santanu M.**

**Co-Founder & CTO**

Nanomaterial formulation & IP  
SPAL architecture design  
Lab-to-prototype translation  
Technical roadmap leadership

[View Profile →](#)



**Kamna Sagar**

**Co-Founder & CSO**

Commercial pilot execution  
India EPC & solar operator outreach  
Supply chain & local partnerships  
B2B deal structuring

[View Profile →](#)



**Dr. Nalin Sharma**

**R&D Head, India**

PhD Nanoengineering, NSYSU  
Institute of Eminence Fellow, IISc  
Experimental validation & data  
Harsh-environment material testing

[View Profile →](#)

# Global IP Ownership + India-First R&D Execution

PARENT COMPANY

## NanoHarvestX Inc.

USA

- Owns core IP and patent portfolio
- Global fundraising entity
- Licensing and strategic partnerships
- Central commercialization structure

100%  
subsidiary

WHOLLY-OWNED SUBSIDIARY

## NanoHarvestX India Pvt. Ltd.

India

- Nanomaterial R&D and prototype development
- Pilot deployments and validation
- Access to cost-efficient talent and infrastructure
- Engineering and local operations

***Core IP developed in India. Owned by the US parent. Investor-friendly structure with fully centralized ownership.***

# Every surface is an untapped power source.

Help us unlock it.

## USE OF \$500K



## 18-MONTH MILESTONES

- Q2 2026** • SPAL layer validation · material stack optimization
- Q3 2026** • Optical + thermal testing · controlled benchmarking
- Q4 2026** • IISc collaborative testing · deployment-readiness
- Q1 2027** • Pilot preparation · early EPC engagement
- Q2 2027** • Initial field pilot · real-world performance data

**\$500K**

Pre-Seed Ask

**18 mo.**

Runway

**Q2 2027**

Pilot Target

[Schedule a Call →](#)