

Perovskite Solar Cells - A New Era of Solar Technology

Exploring the Future of Renewable Energy

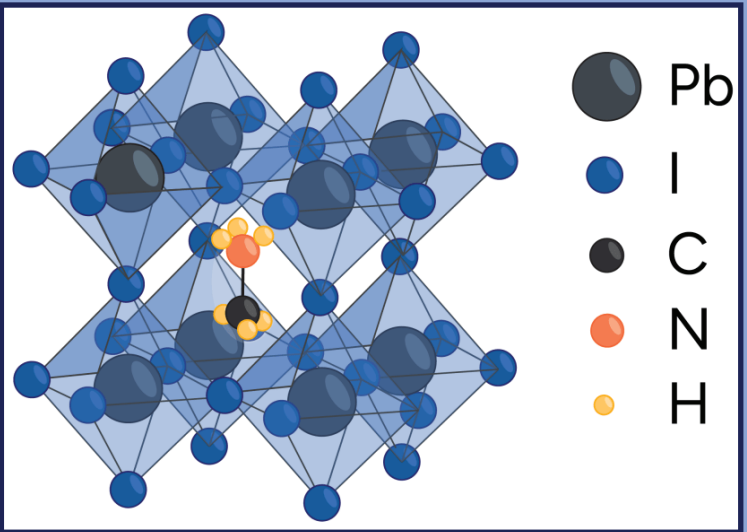
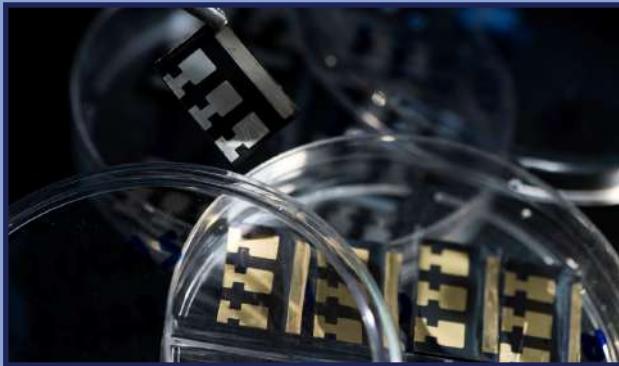


INTRODUCTION

What are Perovskite Solar Cells?
Perovskite solar cells (PSCs) are a **groundbreaking technology** in renewable energy. Their unique crystal structure **allows superior light** absorption and **energy conversion efficiency**. Compared to traditional silicon cells, PSCs promise:

- **Lighter and more flexible designs.**
- **Reduced manufacturing costs.**
- **Adaptability to a variety of applications.**

Why it matters:
Solar energy is essential for a **sustainable future**, and PSCs are paving the way for more **efficient, affordable, and scalable energy solutions**.



Potential:
They have the **ability to revolutionize** the solar energy industry by offering a **cost-effective, efficient, and versatile solution**.

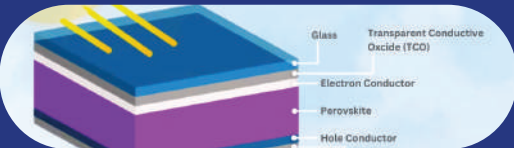
METHODS

The **production of perovskite solar cells** involves **synthesizing crystals, layering materials, and testing for efficiency**. Sustainable materials and **innovative fabrication methods** are incorporated to make this process **more environmentally friendly**.

- Synthesizing Crystals
- Layering Materials
- Testing for Efficiency



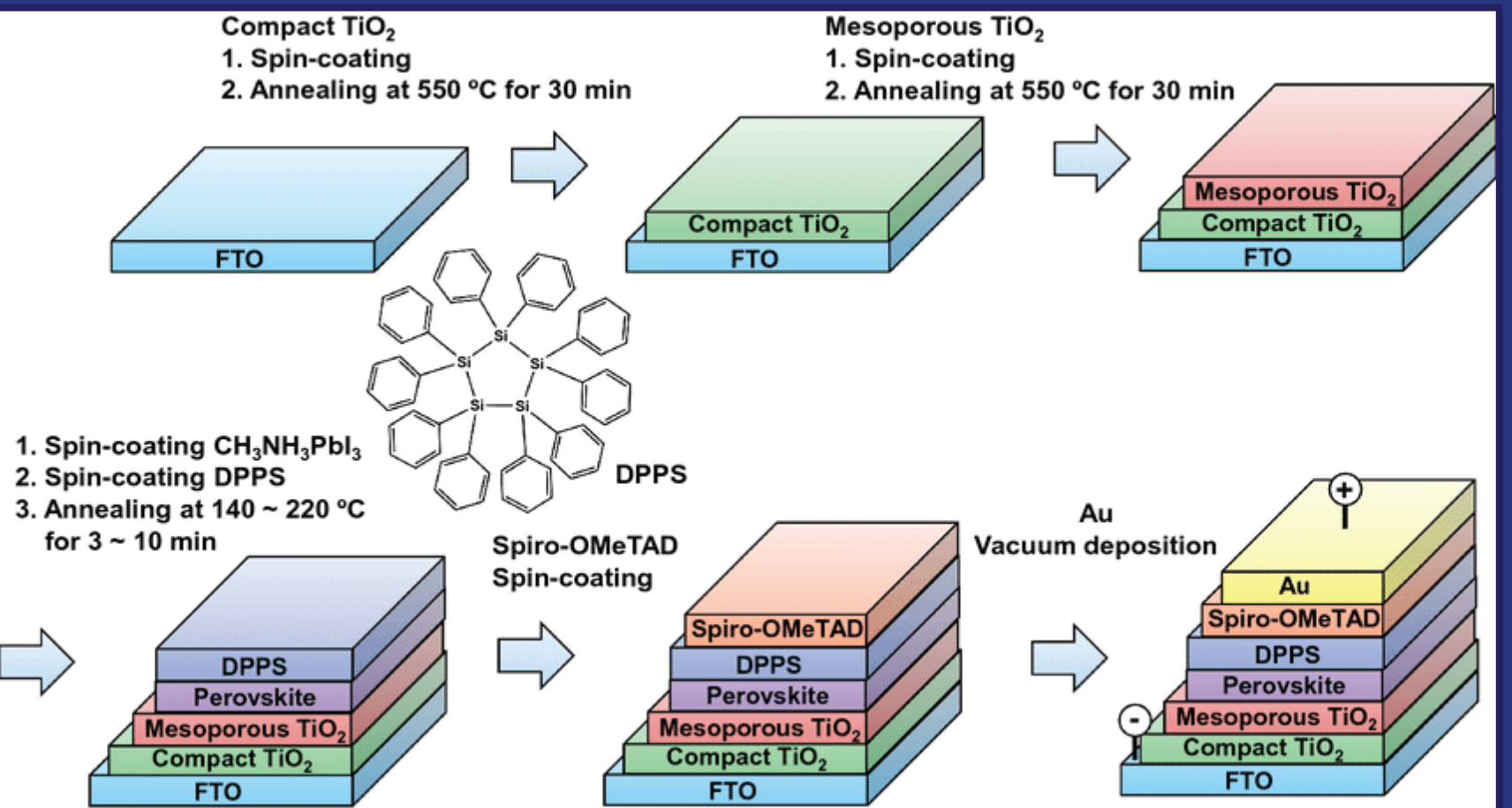
Chemical precursors are mixed to form a perovskite crystal layer. Eco-friendly solvents and room-temperature processes are explored.



Layers include a transparent electrode, perovskite absorber, and a counter electrode. Various deposition techniques like spin-coating and printing are employed.



Light simulation testing for energy conversion. Environmental stress tests to assess durability.

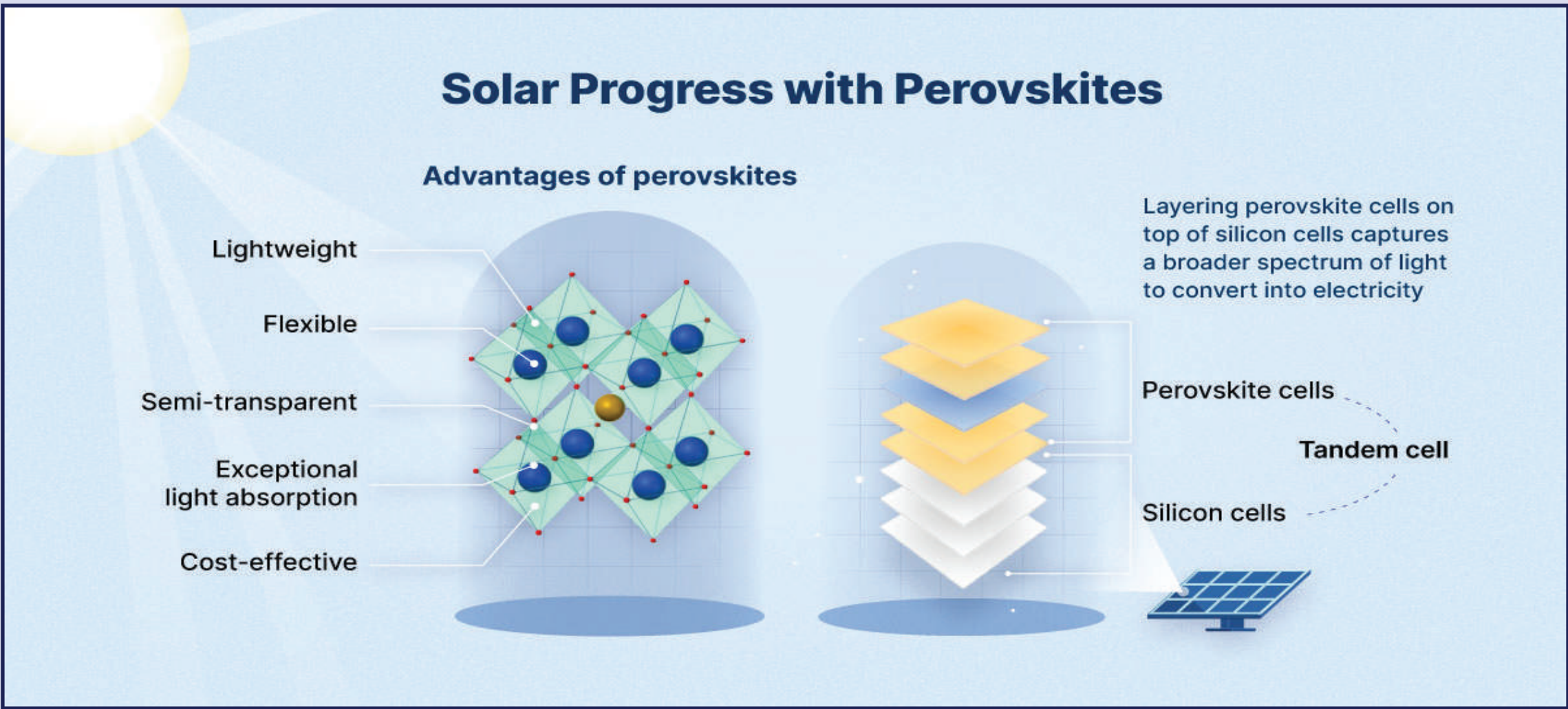
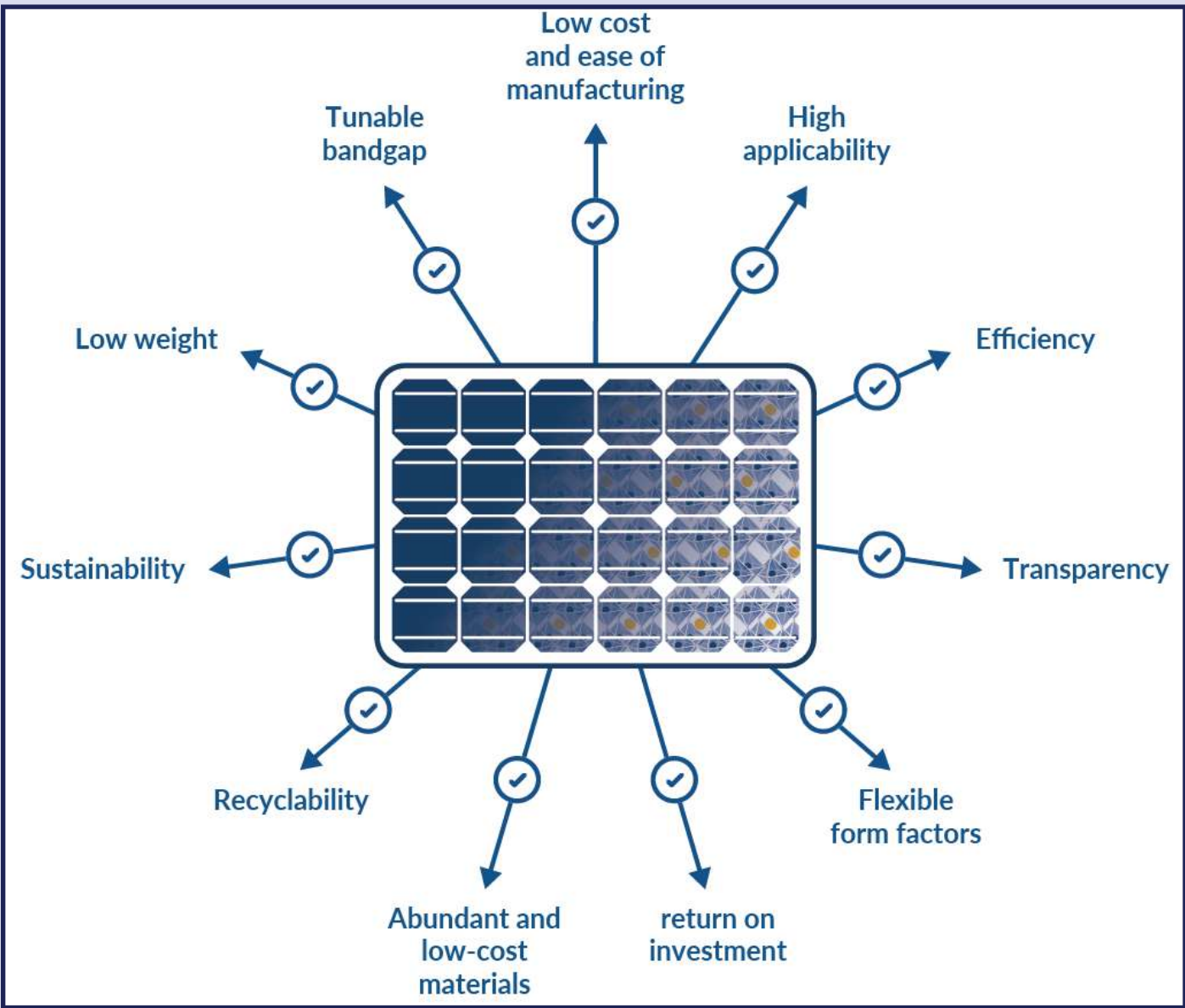


RESULTS

Efficiency Gains:
PSCs have achieved efficiencies **exceeding 25%**, rivaling silicon cells. Enhanced performance **under low-light** conditions.

Cost Benefits:
Production costs are **up to 40% lower** than silicon-based cells.

Flexibility and Application:
Potential for lightweight, **bendable panels** ideal for wearable devices and **portable energy solutions**.



CONCLUSION

Revolutionary Potential: PSCs offer high efficiency and adaptability, surpassing traditional silicon cells.

Cost-Effectiveness: Simpler production and abundant materials lower costs.

Sustainability: Eco-friendly designs support global carbon reduction goals.

Challenges: Stability and large-scale production need solutions.

Silicon-based Solar Cells		Perovskite Solar Cell	
20% or more	Conversion efficiency	20% or more	
Inflexible	Flexibility	High	
Heavy	Weight	Light	
High	Cost	Inexpensive	
High	Durability	Low	

DISCUSSION

1. Moisture & Oxygen Sensitivity

Solution: Advanced encapsulation techniques using **multi-barrier layers** or glass sealing to **block moisture and oxygen**.

2. UV Exposure

Solution: Incorporating **UV-blocking** additives or coatings to **protect the perovskite layer** from degradation due to UV light.

3. Chemical Instability

Solution: Using **stable** compositions like **mixed-cation or halide systems** to enhance chemical robustness.

4. Thermal Instability

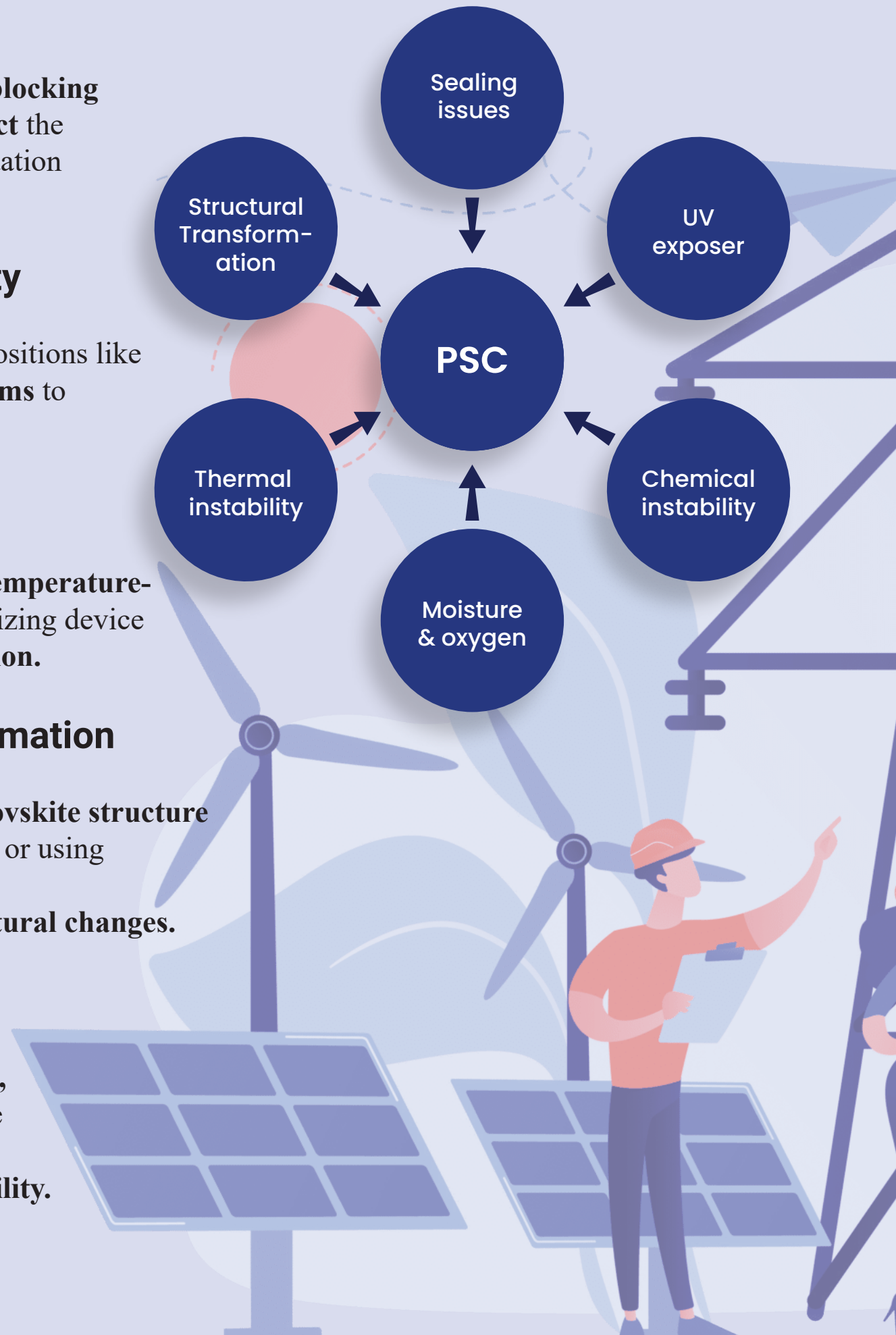
Solution: Introducing **high-temperature-resistant** materials and optimizing device architecture for **heat dissipation**.

5. Structural Transformation

Solution: Stabilizing the **perovskite structure** with additives such as cesium or using **inorganic** frameworks to **prevent structural changes**.

6. Sealing Issues

Solution: Employing **flexible, durable** sealing materials like epoxies or advanced adhesives for **long-term stability**.



REFERENCES

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