



# PEAFOWL INDOOR SENSORS

## MAKING ENERGY BEAUTIFUL

More power from the sun hits the Earth in a single hour than humanity uses in an entire year.

However, despite this abundant, reliable and pollution free energy source, constraints such as cost, inconsistency, aesthetics and space prevent widespread utilization.

To solve the world's growing need for clean power, innovation is required for new solar technologies which are efficient, stable, sustainable and seamlessly incorporated into modern living.

## IoT CONNECTED DEVICES

With more than 30 billion connected IoT devices in the world, according to [Security Today](#), IoT Infrastructure with Smart Buildings are already at the forefront, driven by the many sensors needed to gather real-time data about the indoor environment.

The data provided will improve life and living conditions at home, in the office, commercial venues and public areas.

The challenge is to power all these devices and, at the same time, limit or remove cables and batteries while maintaining aesthetics and handling security.

Sensors could be placed at:

picture

window



table top

## KEY BENEFITS

- **Highly transparent – >90%**
- **Colorless or optional color**
- **Sustainable – no rare or toxic materials used**
- **Suitable for indoor lighting conditions**
- **Eliminates batteries or extends battery life**
- **Inkjet printed – locally**

## IoT INFRASTRUCTURE

Residential and commercial buildings account for 20% of global delivered energy consumption, according to [US EIA](#). Smart building technology can cut energy consumption for light and HVAC in buildings with more than 20%, according to a study by [ACEEE](#).

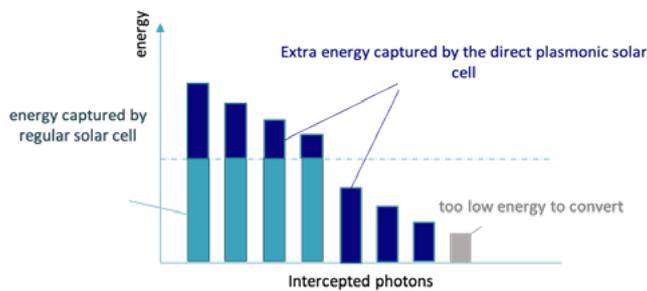
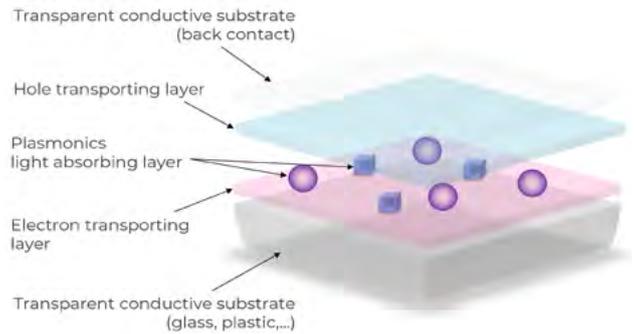
Implementation of this technology is detained because current solutions, with dependency on batteries, are unsustainable to scale for the trillions of sensors needed and expensive to maintain in terms of battery changes and material recycling.

Our technology makes it possible to implement smart building technology in both new and existing buildings, enabling sustainable digitalization that will make our cities safer and greener without compromises in living standard.

# TECHNOLOGY

Peafowl Solar Power is a spin-out of Uppsala University, Sweden. We have developed a new direct plasmonic solar technology. Our innovative technology can generate power from transparent surfaces, such as windows and displays, and converts both indoor and outdoor light into electricity. Our technology is flexible and can be printed onto glass, plastics, and other materials to create self-powered devices without impacting aesthetics or design.

The cell architecture consists of three layers, all made from non-toxic, readily available materials which can be incorporated into standard low-temperature printing processes, that are cost effective and scalable.



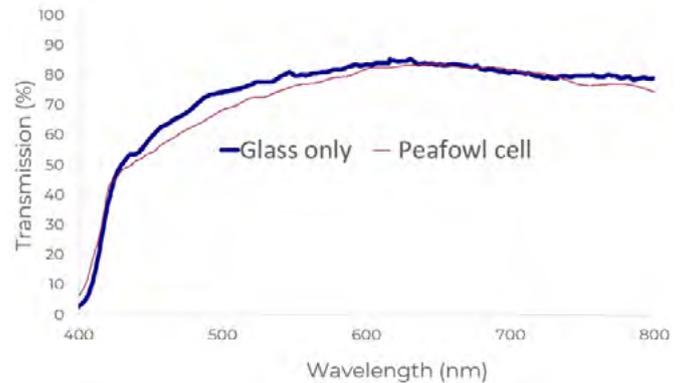
## EFFICIENT ENERGY CONVERSION

Previous photovoltaic technology only converts specific amounts of energy per photon and waste the rest, requiring high light interception. Plasmonic nanoparticles absorb light by resonance instead of excitation, thus capturing all the energy of a photon.

Efficient energy conversion and extreme light absorption, enable our exceptionally high transparency, as excess light is not intercepted.

## PLASMONIC NANOPARTICLES

The key to our transparent cells is that we use plasmonic nanoparticles as light absorbers. This increases absorption of intercepted light up to tenfold over other materials. As the diagram shows, the impact on transparency of adding Peafowl solar cells to a glass surface is almost negligible. Light spectrum absorption is easily tuned by changing particle morphology.



DEMO CELL PERFORMANCE <sup>1)</sup> with transparency >90%**		
ILLUMINATION	STC <sup>2)</sup>	500 lux <sup>3)</sup>
Voltage [V]	0.60	0.60
Current [ $\mu\text{A}/\text{cm}^2$ ]	120	7
Fill factor	40%	40%

<sup>1)</sup> Our technology can be tailored to specific illumination conditions and requirements for transparency, color, power etc. Values on a single pane of conductive substrate and AZO as back contact

<sup>2)</sup> Standard Test Conditions (1 SUN)

<sup>3)</sup> Reference for common indoor light conditions

\*\* Values on a single pane of conductive substrate and AZO as back contact

## COMMERCIAL APPROACH

Our technology is suitable for many applications where renewable, sustainable and flexible energy is needed to enhance modern living without costly compromises. For smart buildings we focus on indoor sensors, making them self-powered so that batteries can either be eliminated entirely or by extending the battery lifetime to equal the device lifespan, reducing the amount of batteries and maintenance costs.

We offer flexible commercial terms based on customer needs, including licensing, royalty, revenue share and joint ventures. We have the capability to co-develop innovative solutions for specific applications together with partners who can contribute resources and know-how in product design and manufacturing.

We practice a deployable manufacturing model, where the printing of our solar cells can be integrated into the production process of sensors locally, wherever they are produced.