

Synthetic solar storage

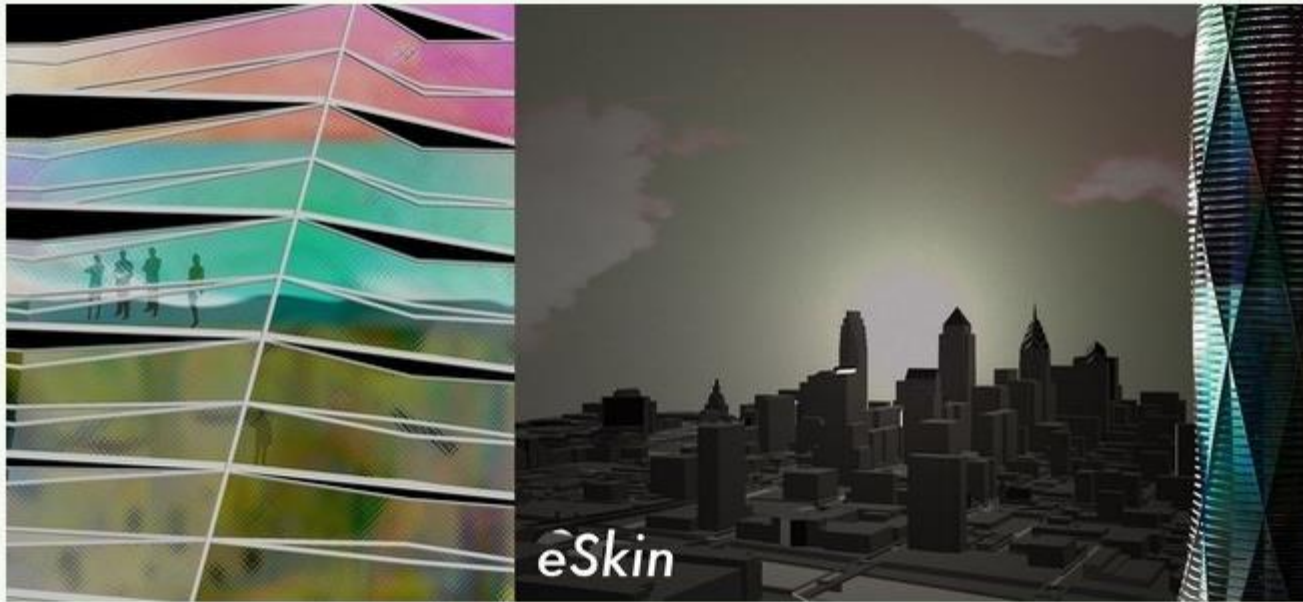


Photosynthetically inspired energy storage & artificial photosynthesis.

Challenges Solved

Storage of solar energy, efficient harvesting of solar energy.

eSkin



Adaptive, sensory building skins

Challenges Solved

Non-optimized building skins, inability of buildings to adapt to changing external environments.

Vibro-Wind

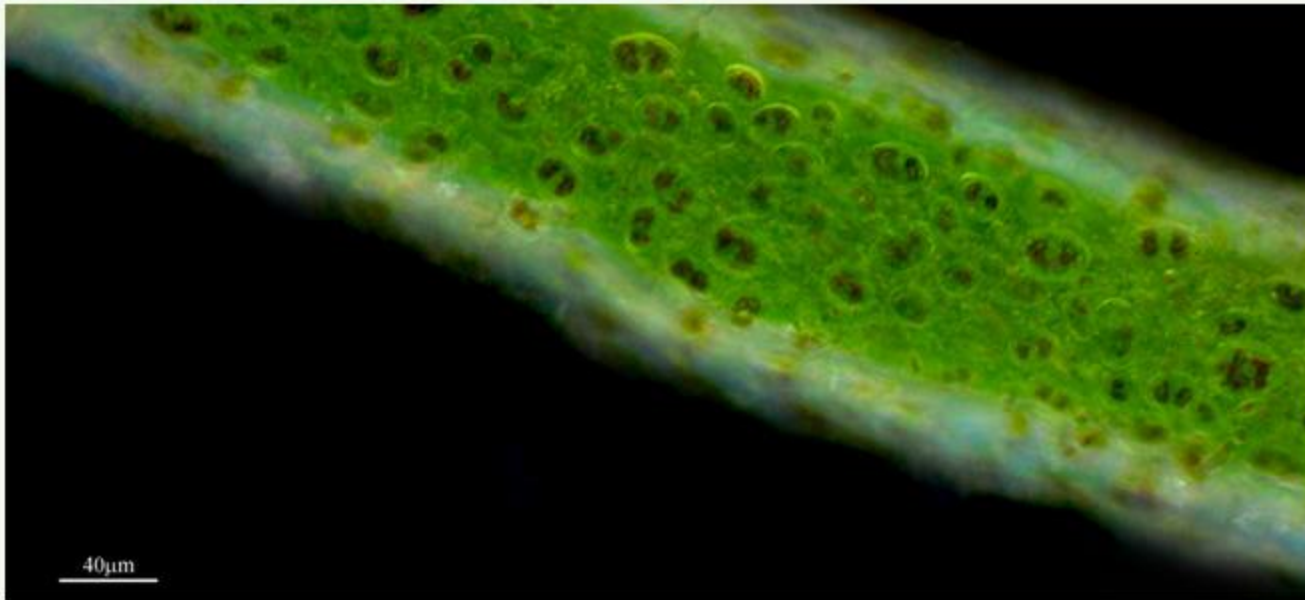


Harvesting wind without the turbine

Challenges Solved

Wind turbine shortcomings, wind energy deployment in an urban environment, cost of traditional wind turbines.

Polymer-cellulosic batteries



Algae transform polymer-cellulosic batteries

Challenges Solved

Charging performance weakness in cellulosic batteries; weight of metal ion batteries; environmental consequences of traditional batteries; cost of ionic solutes.

Keeping cool

Branches protected from the sun: quiver tree



The branches of a quiver tree are protected from the heat of the sun by a reflective coating of white powder.

Biomimicry Taxonomy

- Maintain physical integrity >
- Protect from abiotic factors >
- Temperature

Biomimetic Application Ideas

Capture and transfer of UV radiation for photovoltaic applications, UV reflectors incorporated into windows in buildings and autos, UV reflective coatings, sunscreen.

Ventilated nests remove heat and gas: mound-building termites



Mounds of macrotermite termites maintain homeostasis through tunnels, chimneys, and use of wind creating pressure fields.

Biomimicry Taxonomy

- Get, store, or distribute resources >
- Distribute >
- Gases

Biomimetic Application Ideas

Use for low-cost ventilation of buildings.

Features enhance cooling effect: shade trees



The cooling effects of shade trees in subtropical regions are most influenced by foliage density, leaf thickness, leaf texture, and leaf color lightness.

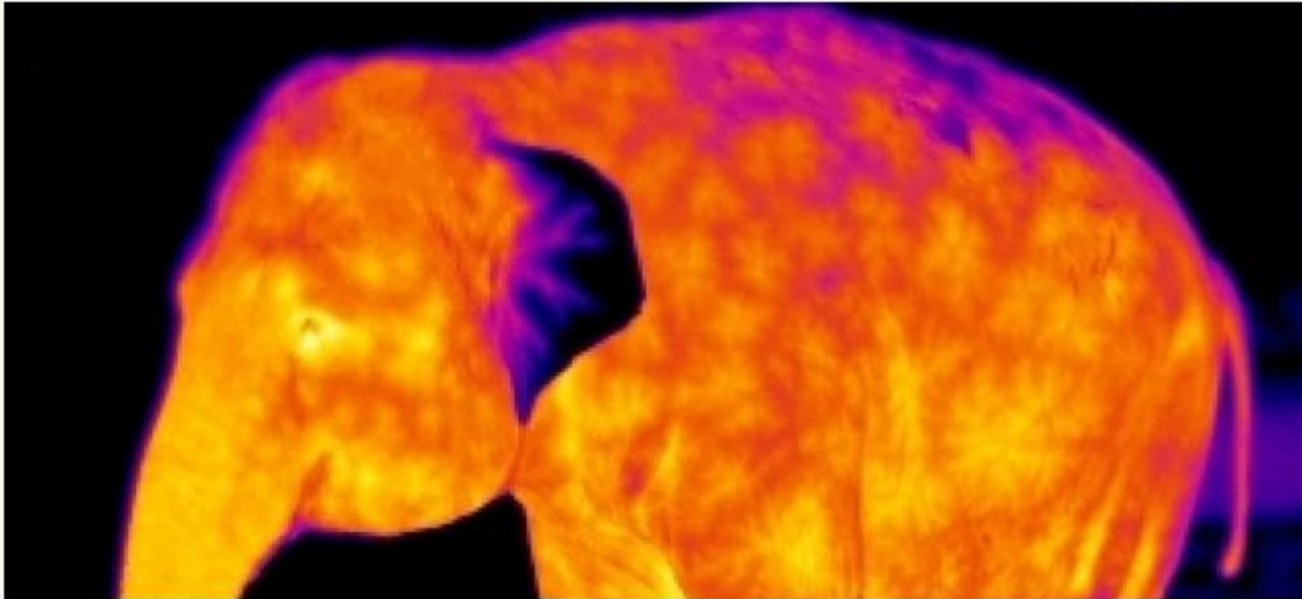
Biomimicry Taxonomy

- Maintain physical integrity >
- Protect from abiotic factors >
- Temperature

Biomimetic Application Ideas

- Designing shading techniques for buildings, walkways, parks.
- Selecting trees for decreasing heat island effect in cities.

Skin fine-tunes internal temperature: African elephant



The skin of elephants allows them to fine-tune thermal regulation via 'hot spots', patches of skin that are highly vascularized.

Biomimicry Taxonomy

- Maintain physical integrity >
- Regulate physiological processes >
- Homeostasis

Biomimetic Application Ideas

- Creating "vascularized hot spots" on buildings, computers, clothing, sleeping bags, etc.

Body buffers thermal variations: sea star



The body of sea stars helps buffer thermal variations experienced in low tide by taking up and storing cold sea water during high tide.

Biomimicry Taxonomy

- Maintain physical integrity >
- Regulate physiological processes >
- Homeostasis

Biomimetic Application Ideas

Buffer temperature fluctuations in buildings, computer equipment by adding a fluid.

Bark keeps surface cool under the sun: trees



Bark of trees keeps surface cool by minimizing absorption of solar light and maximizing thermal emission

Biomimicry Taxonomy

- Maintain physical integrity >
- Protect from abiotic factors >
 - Light

Biomimetic Application Ideas

- Paints that keep buildings, materials cool
- Solar cells

Large ears used to cool off: jackrabbit



The large ears of the jack rabbit are used in cooling, radiating heat via an extensive network of blood vessels.

Biomimicry Taxonomy

- Maintain physical integrity >
- Protect from abiotic factors >
- Temperature

Biomimetic Application Ideas

Heat collectors for buildings that are raised for nighttime cooling, building designs that funnel excess heat to a single room, extendable parts to cool electronics in sleep mode.

Shell protects from heat: desert snail



The shell of some desert snails helps them survive extreme heat using light reflectance and architecturally-derived, insulating layers of air.

Biomimicry Taxonomy

- Maintain physical integrity >
- Protect from abiotic factors >
- Temperature

Biomimetic Application Ideas

- Building design in hot, arid environments

Bill used as heat exchanger for thermoregulation: toco toucan



Bill of toco toucan acts as a heat exchanger to regulate body temperature by adjusting blood flow

Biomimicry Taxonomy

- Get, store, or distribute resources >
- Distribute >
- Energy

Biomimetic Application Ideas

- Energy efficient building HVAC systems, such as solar hot water systems and heat/energy recovery ven

Gular fluttering dissipates heat: nightjars



The gular sack of nightjars helps to dissipate heat efficiently by vibrating.

Biomimicry Taxonomy

- Maintain physical integrity >
- Regulate physiological processes >
- Homeostasis

Biomimetic Application Ideas

- Moist mesh material that vibrates to create evaporative cooling

Lingual rete precools blood: gray whale



Lingual retes of gray whales precool blood in the tongue to avoid heat loss via counter-current heat exchange.

Biomimicry Taxonomy

- Maintain physical integrity >
- Regulate physiological processes >
- Homeostasis

Biomimetic Application Ideas

- Large scale heat exchange for airplanes, buildings, hospital beds
- Energy transfer devices like solar thermal
- Cooling computers and other electronics

Blubber absorbs heat: bottlenose dolphin



The blubber of the bottlenose dolphin absorbs heat by acting as a phase change material

Biomimicry Taxonomy

- Get, store, or distribute resources >
- Capture, absorb, or filter >
- Energy

Biomimetic Application Ideas

- Materials for solar thermal energy storage
- Textiles that maximize solar heat gain