



# BIOMIMICRY

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# Biomimicry

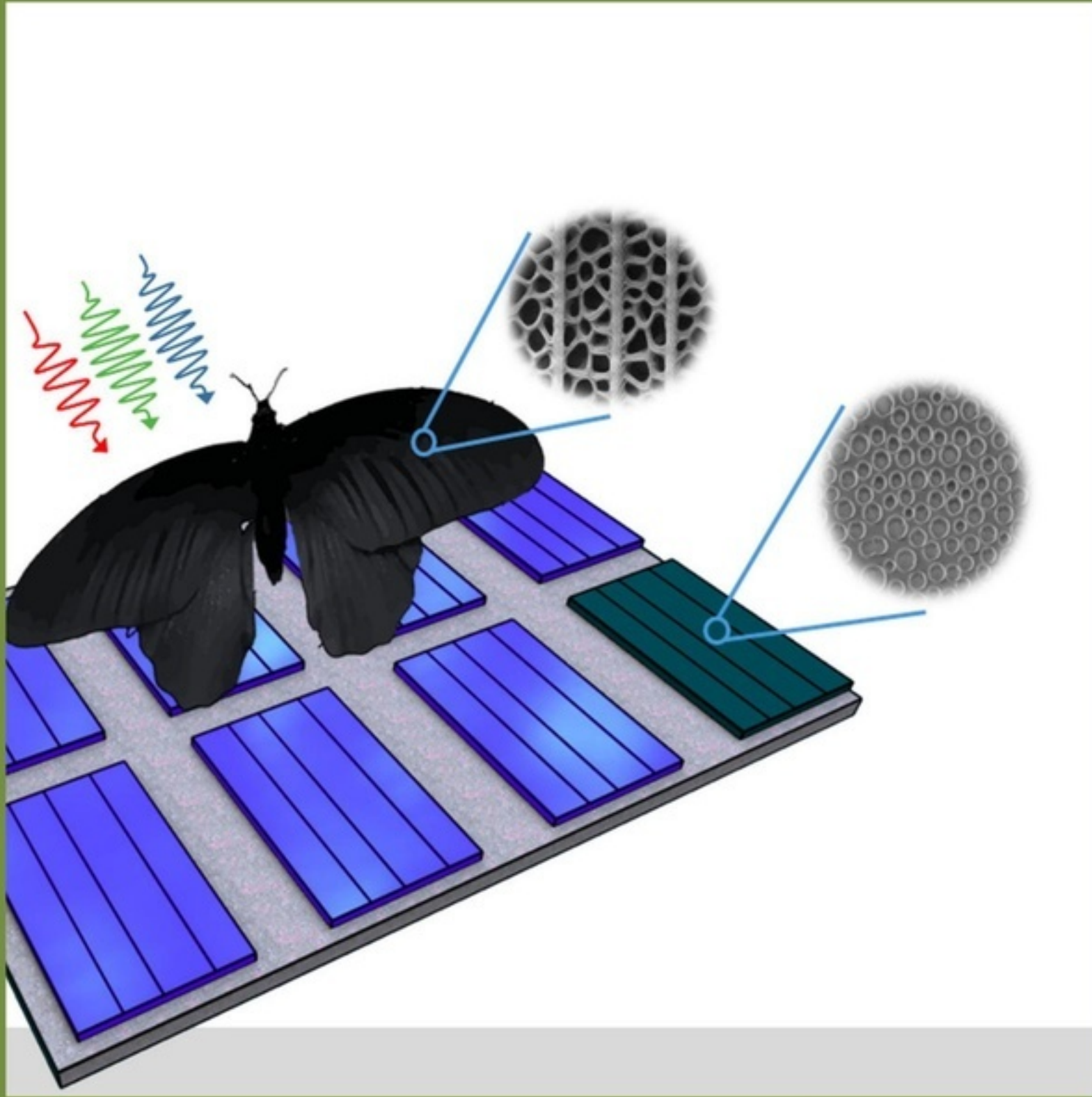


What is biomimicry? It is simply the design and production of materials, structures, and systems that are modeled on biological entities and processes. To put it simply, biomimicry is human products modeled off of nature! Just another reason to the long list of reasons to value and protect the environment!

# Nature Walk



# Introducing: Butterfly Wing-Inspired Solar Cells



The need for efficient solar energy:

- The world's total solar photovoltaic (PV) capacity reached over **800 gigawatts**.
- The solar industry employs millions of people worldwide. In 2020, it supported over **3 million jobs**, and this number has continued to rise.
- The cost of solar energy has seen a significant decline. Solar panels' cost per watt has dropped by **more than 80%** over the past decade, making solar power more affordable and accessible.

# Design Process



## Distill

**“Why do you want to make that?”** Solar energy is of paramount importance for various reasons, and its significance continues to grow as the world faces environmental, economic, and energy-related challenges. Efficient solar energy will be renewable/sustainable, increase energy independence, stimulate job creation, and reduce greenhouse gasses.



## Translate

**“Why does nature do that function?”** The iridescent colors of butterfly wings are a result of nanostructures that manipulate light. These nanostructures give rise to vibrant, iridescent colors without the use of pigments. The microscopic structures on the surface of butterfly wings create color through the interference and scattering of light. Biomimetic solar cells incorporate similar nanostructures to enhance their light-capturing capabilities. These solar cells capture and convert sunlight into electricity using the same principles that allow butterfly wings to display vivid colors.



## Discover

**“What background information do you need?”** While on our nature walk, we encountered a plethora of beautiful butterflies whose wings glistened in the sunlight. After receiving this inspiration, I combed through the literature and found scientific journal articles that could provide the basis needed to create my design in real life.

# Design Process continued

## Emulate and Evaluate

### Advantages:

- **Enhanced Light Absorption:** Butterfly-inspired solar cells capture a broader spectrum of sunlight, resulting in improved energy conversion efficiency.
- **Lightweight and Thin:** These solar cells can be made thin and lightweight, making them suitable for a wide range of applications, from building-integrated solar panels to portable electronics.
- **Sustainable and Aesthetic:** They offer an environmentally friendly approach to solar energy production and can be designed in various colors and patterns, making them visually appealing and versatile.

### Real Life Application:

By mimicking the intricate nanostructures found in nature, such as those on butterfly wings, scientists and engineers can create advanced technologies that are not only more efficient but also environmentally friendly and visually striking. This is a prime example of biomimicry at work.

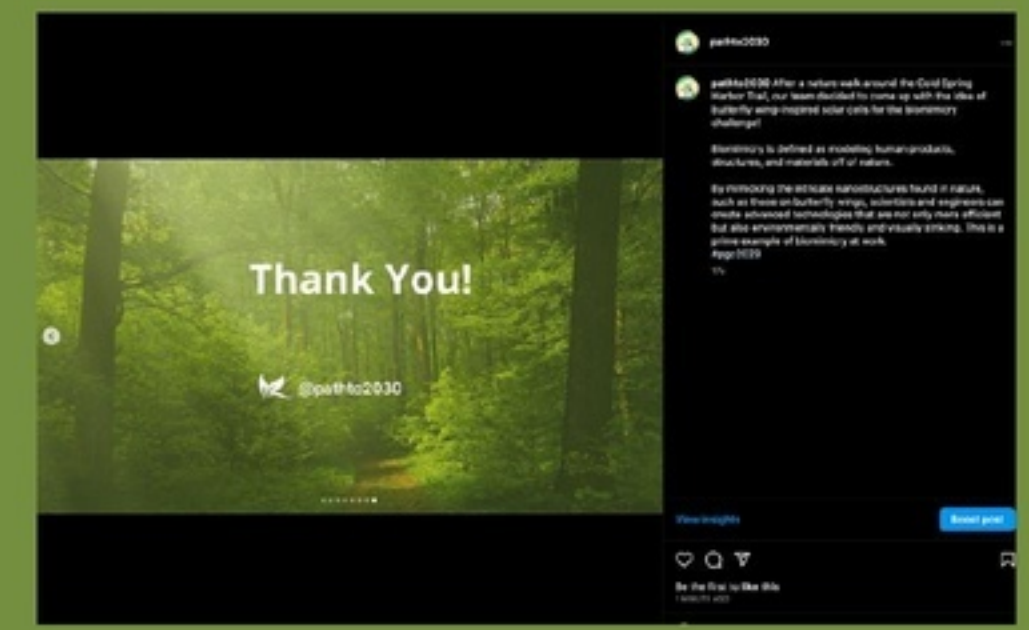
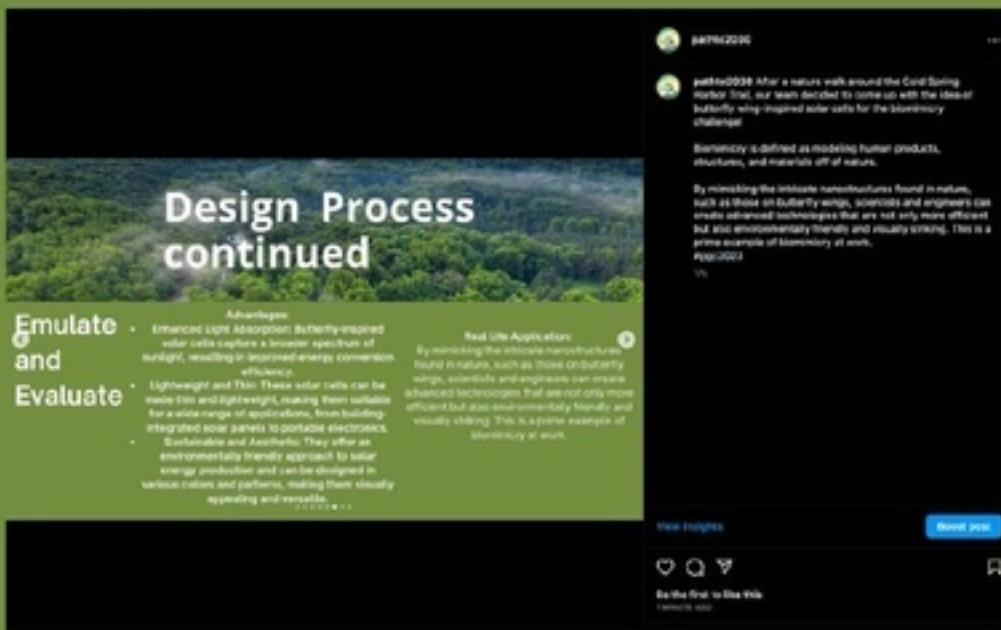
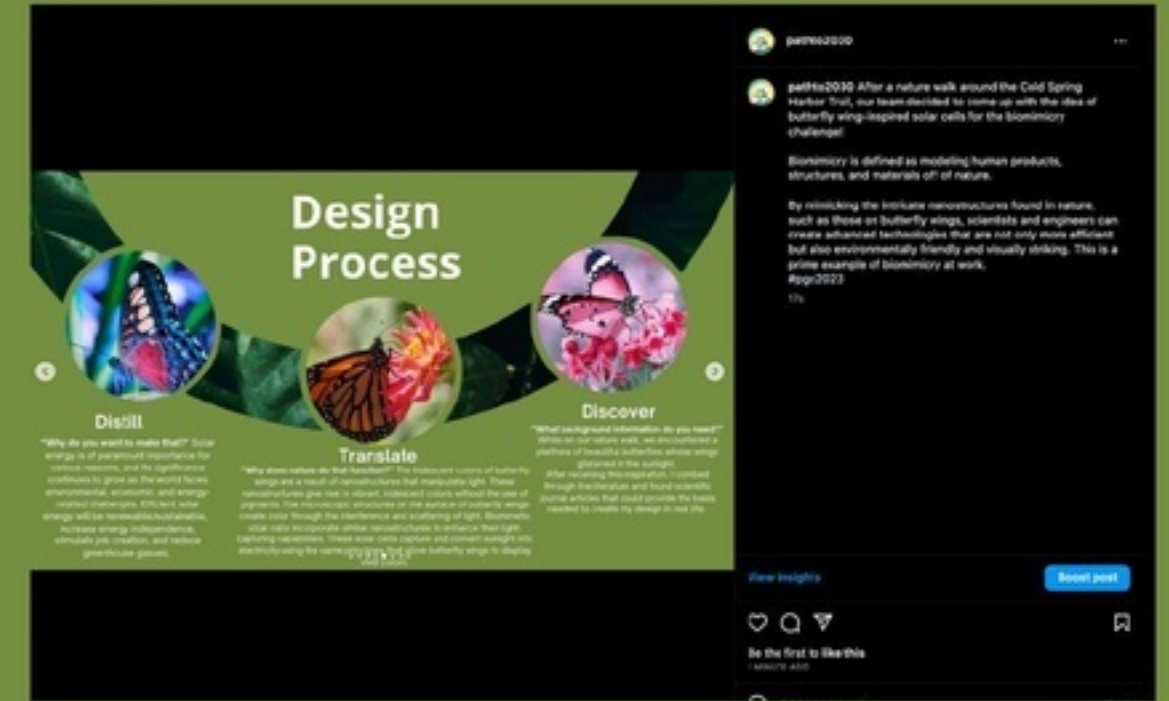
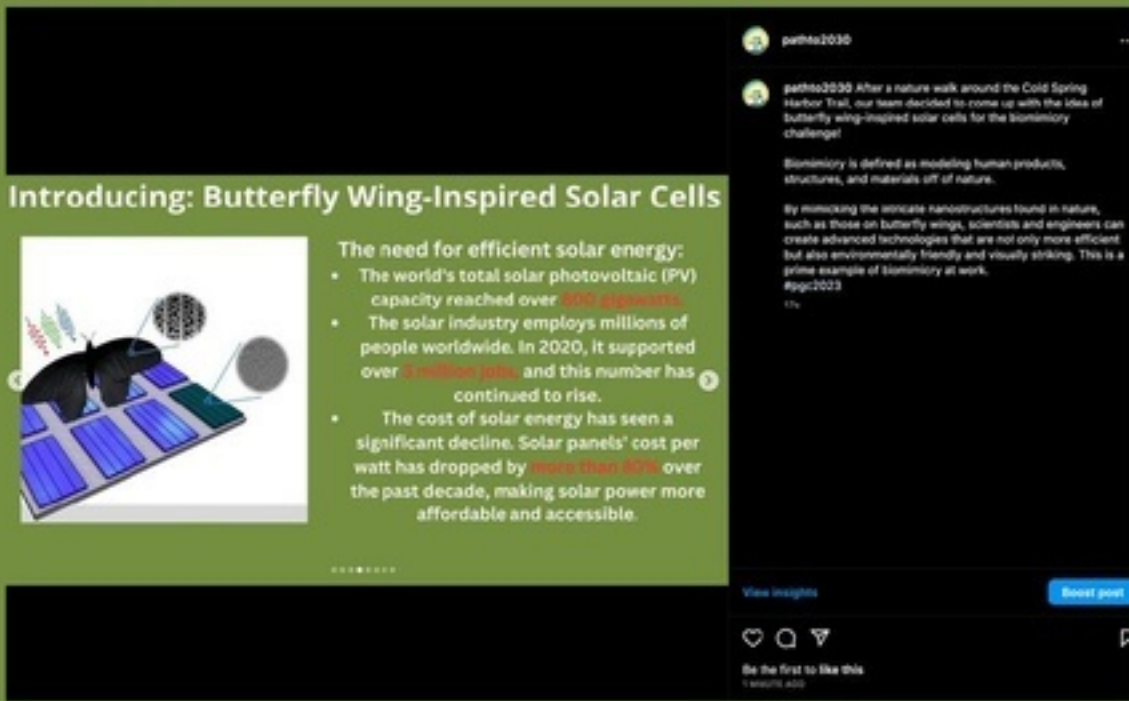
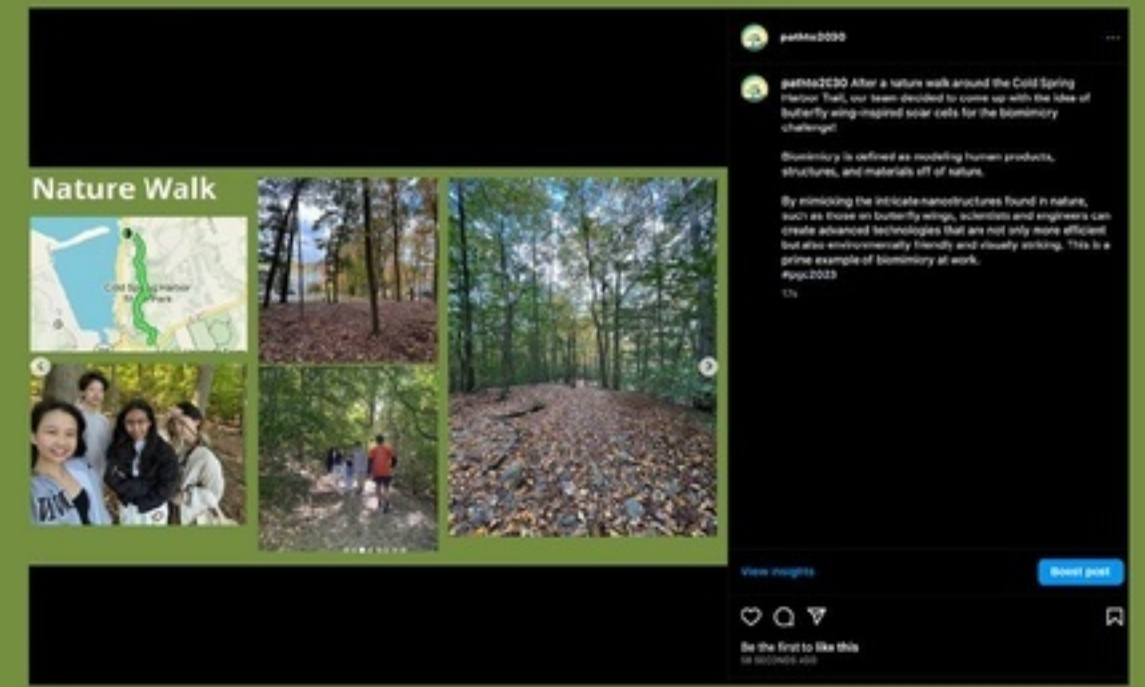
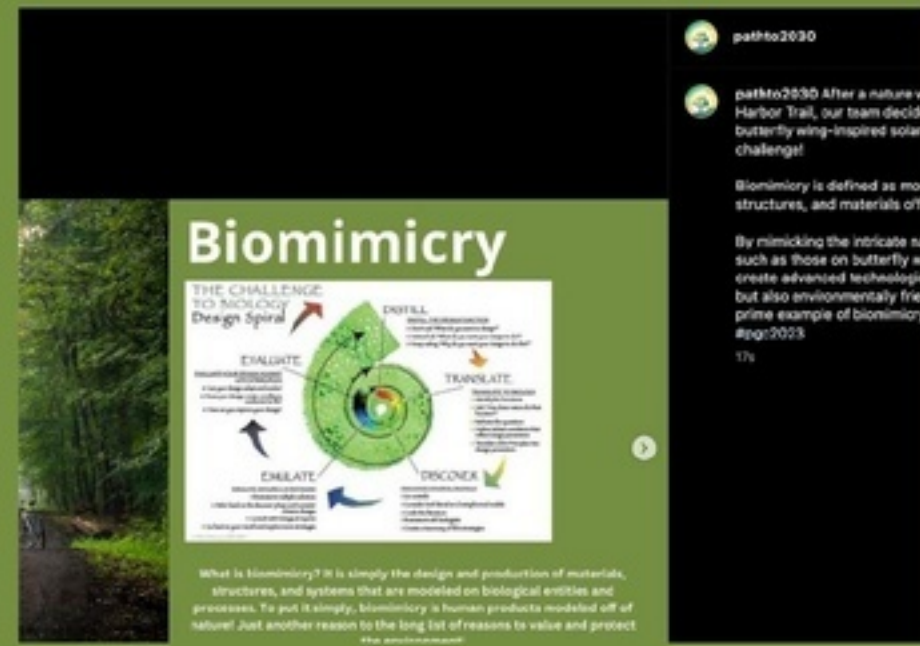
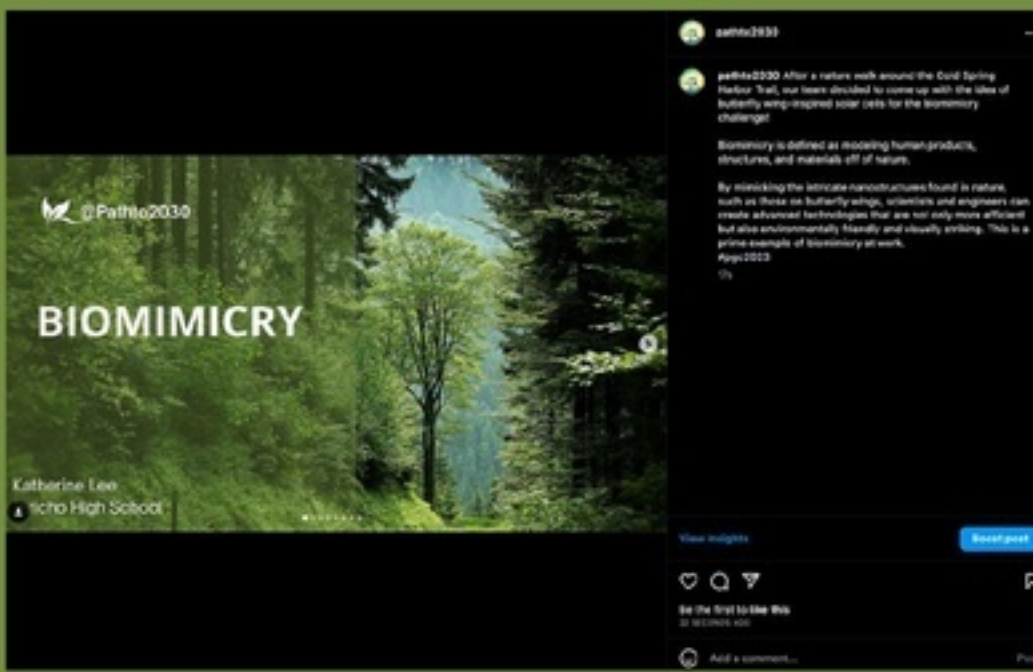
# Conclusion

While butterfly wing-inspired solar cells are still an idea, they hold great promise for improving the efficiency and aesthetics of solar energy systems.

Potential applications include energy-efficient and visually appealing solar panels for buildings, as well as flexible, lightweight solar cells for portable electronic devices.

In essence, biomimicry in this context involves borrowing the intricate light-manipulating features of butterfly wings to create more efficient and visually attractive solar cells. This approach leverages the natural world's elegance and adaptability to address challenges in renewable energy technology.







# Thank You!



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