
Name: _____

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Class: _____



TECHSHEETS.DEV

GREEN TECH SERIES

Michael Grätzel

The Pioneer of Artificial Photosynthesis

When you think of a solar panel, you probably picture a heavy, dark blue, rigid rectangle sitting on top of a roof. These traditional panels are made of silicon, which can be expensive to purify and manufacture. But what if a solar panel could be as thin as plastic, cheap to make, and even semi-transparent like a window? Thanks to a Swiss chemist named **Michael Grätzel**, this is already a reality.

In 1991, Michael Grätzel and his colleague Brian O'Regan invented the **Dye-Sensitized Solar Cell (DSSC)**, famously known today as the "Grätzel cell." Instead of relying on rigid silicon, Grätzel looked to nature for inspiration. He wanted to copy how plants make energy from the sun—a process called *photosynthesis*.

In a Grätzel cell, a special colored dye acts just like the chlorophyll in a plant leaf. When sunlight hits the dye, it gets "excited" and releases tiny electrical particles called electrons. These electrons are then caught by a layer of titanium dioxide—the exact same cheap, white powder used to make toothpaste, sunscreen, and white paint! This process creates a steady flow of clean electricity.

Grätzel cells are a massive breakthrough in **Green Technology** because they solve problems traditional panels can't. First, they are much cheaper and easier to manufacture. Second, they can be printed onto flexible materials, meaning you could have solar panels on a backpack or a curved tent. Third, they work incredibly well in low-light and cloudy conditions. Most importantly, because they can be made semi-transparent in different colors, architects are now using Grätzel cells to build entire skyscraper windows that secretly generate electricity!

Part 1: Reading Comprehension

1. What natural process did Michael Grätzel mimic to create his new solar cells?

2. What role does the "dye" play in a Grätzel cell?

3. What common household items contain titanium dioxide, the material used in Grätzel cells?

4. Name at least two advantages Grätzel cells have over traditional silicon solar panels.

Part 2: Critical Thinking

5. Biomimicry is when scientists invent things by copying designs found in nature. Michael Grätzel copied leaves. If you were a green tech scientist, what other plant or animal would you study to try to invent a new technology, and why?

Part 3: The Solar Skyscraper Challenge

A city wants to make its skyscrapers generate their own clean energy. They have to decide between putting traditional silicon panels on the roof, or using semi-transparent Grätzel cell windows on the sides of the building. Let's do the math!



Traditional Roof Panels

Produce: **20 Units** of energy per square meter.
Space available on roof: **1,000** sq meters.



Grätzel Solar Windows

Produce: **5 Units** of energy per square meter.
Space available on windows: **20,000** sq meters.

Step A: Calculate total energy from the Roof Panels.

20 Units × 1,000 sq meters = _____ Total Units

Step B: Calculate total energy from the Solar Windows.

5 Units × 20,000 sq meters = _____ Total Units

Step C: The Big Conclusion

Even though Grätzel windows are individually weaker than roof panels, which option produces more *total* energy for the skyscraper, and why?
