

Read the article and fill the gaps with appropriate words.

DYE-SENSITIZED SOLAR CELLS

Adapted from http://en.wikipedia.org/wiki/Dye-sensitized_solar_cell

catalyst	electrode	semiconductor	separate
dioxide	occurs	amount	current
transparent	nanomaterial	cathode	dye

Grätzel's cell is composed of a porous layer of titanium **1.** nanoparticles, covered with a molecular **2.** that absorbs sunlight, like the chlorophyll in green leaves. The titanium dioxide is immersed under an electrolyte solution, above which is a platinum-based **3.** As in a conventional alkaline battery, an anode (the titanium dioxide) and a **4.** (the platinum) are placed on either side of a liquid conductor (the electrolyte).

Sunlight passes through the **5.** electrode into the dye layer where it can excite electrons that then flow into the titanium dioxide. The electrons flow toward the transparent electrode where they are collected for powering a load. After flowing through the external circuit, they are re-introduced into the cell on a metal **6.** on the back, flowing into the electrolyte. The electrolyte then transports the electrons back to the dye molecules.

Dye-sensitized solar cells **7.** the two functions provided by silicon in a traditional cell design. Normally the silicon acts as both the source of photoelectrons, as well as providing the electric field to separate the charges and create a **8.** In the dye-sensitized solar cell, the bulk of the semiconductor is used solely for charge transport, the photoelectrons are provided from a separate photosensitive dye. Charge separation **9.** at the surfaces between the dye, semiconductor and electrolyte.

The dye molecules are quite small (nanometer sized), so in order to capture a reasonable **10.** of the incoming light the layer of dye molecules needs to be made fairly thick, much thicker than the molecules themselves. To address this problem, a **11.** is used as a scaffold to hold large numbers of the dye molecules in a 3-D matrix, increasing the number of molecules for any given surface area of cell. In existing designs, this scaffolding is provided by the **12.** material, which serves double-duty.