

# Artificial photosynthesis

This glossary has been prepared independently of Alexander Cowan, by one of the SciBar participants.

<p><b>Artificial photosynthesis</b> The process that produces fuels (e.g. hydrogen, or hydrocarbon fuels such as methane and methanol) using only sunlight, water and carbon dioxide as inputs. This would remove our reliance on fossil fuel resources and also reduce carbon dioxide emissions from burning fossil fuels.</p> <p><b>Carbon-neutral</b> A fuel or process that does not add any carbon dioxide to the atmosphere overall, meaning it would not contribute to the global warming that results from the burning of oil and coal.</p> <p><b>Feedstock</b> Hydrogen and simple carbon-based fuels used as raw materials used by many industries including plastics, fertilisers, pharmaceuticals as well as synthetic fuels for transport.</p> <p><b>Fuel</b> A material that stores energy in chemical bonds. The stored energy can be released when required, in a chemical reaction such as burning.</p> <p><b>Hydrogen (as a fuel)</b> Can be used as a fuel by itself – such as in hydrogen-powered cars – or reacted with carbon monoxide to make liquid hydrocarbon fuels or feedstocks.</p> <p><b>Photoabsorber</b> A material that absorbs light and produces charge-carriers. For example semiconductors in solar panels, and the green pigment molecule chlorophyll in leaves.</p>	<p><b>Photocatalyst</b> A substance that uses sunlight as the energy source to speed up a chemical reaction, without being used up in the reaction. Used for artificial photosynthesis reactions such as water splitting or reduction of carbon dioxide to carbon monoxide.</p> <p><b>Photon</b> A tiny packet (or quantum) of light energy, or of other electromagnetic radiation such as infrared, ultraviolet, radio, X-rays.</p> <p><b>Photosynthesis</b> The process by which plants and algae use solar energy to chemically convert carbon dioxide and water into glucose. Glucose can be thought of as a fuel that provides the energy that enables plants and animals to live, grow and reproduce. Manganese-containing enzymes act as the catalyst when plants photosynthesise.</p> <p><b>Solar fuel</b> Fuels such as hydrogen and methanol produced directly using sunlight. These substances are currently produced from non-renewable fossil fuels.</p> <p><b>Water-splitting process</b> Splitting water into hydrogen and oxygen. Actually two separate chemical reactions: oxidation of H<sub>2</sub>O to give oxygen and an electron, and reduction of another H<sub>2</sub>O by an electron to give hydrogen. Researchers are looking for a way to carry out the first reaction using sunlight as an energy source, with a suitable catalyst to speed up the rate of reaction.</p>
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