

Nobel Prize in Chemistry 2007



Gerhard Ertl

The Nobel Prize in Chemistry 2007 was awarded to Gerhard Ertl *"for his studies of chemical processes on solid surfaces"*.

Information about winners:

Gerhard Ertl

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Summary of research work:

Modern surface chemistry – fuel cells, artificial fertilizers and clean exhaust

The Nobel Prize in Chemistry for 2007 is awarded for groundbreaking studies in surface chemistry. This science is important for the chemical industry and can help us to understand such varied processes as why iron rusts, how fuel cells function and how the catalysts in our cars work. Chemical reactions on catalytic surfaces play a vital role in many industrial operations, such as the production of artificial fertilizers. Surface chemistry can even explain the destruction of the ozone layer, as vital steps in the reaction actually take place on the surfaces of small crystals of ice in the stratosphere. The semiconductor industry is yet another area that depends on knowledge of surface chemistry.

It was thanks to processes developed in the semiconductor industry that the modern science of surface chemistry began to emerge in the 1960s. **Gerhard Ertl** was one of the first to see the potential of these new techniques. Step by step he has created a methodology for surface chemistry by demonstrating how different experimental procedures can be used to provide a complete picture of a surface reaction. This science requires advanced high-vacuum experimental equipment as the aim is to observe how individual layers of atoms and molecules behave on the extremely pure surface of a metal, for instance. It must therefore be possible to determine exactly which element is admitted to the system. Contamination could jeopardize all the measurements. Acquiring a complete picture of the reaction requires great precision and a combination of many different experimental techniques.

Gerhard Ertl has founded an experimental school of thought by showing how reliable results can be attained in this difficult area of research. His insights have provided the scientific basis of modern surface chemistry: his methodology is used in both academic research and the industrial development of chemical processes. The approach developed by Ertl is based not least on his studies of the Haber-Bosch process, in which nitrogen is extracted from the air for inclusion in artificial fertilizers. This reaction, which functions using an iron surface as its catalyst, has enormous economic significance because the availability of nitrogen for growing plants is often restricted. Ertl has also studied the oxidation of carbon monoxide on platinum, a reaction that takes place in the catalyst of cars to clean exhaust emissions.

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