

Electroplating

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Introduction to Electroplating

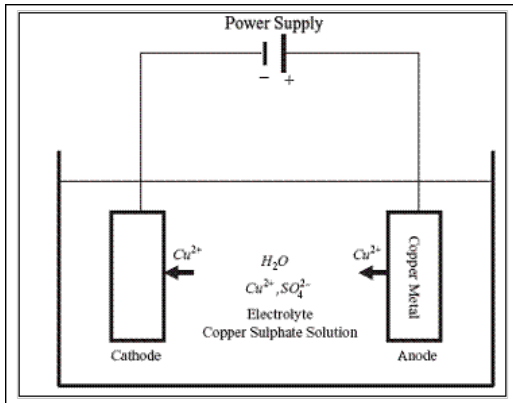
"The process of depositing a layer of any desired metal on another material, by means of electricity, is called electroplating."

What is Electroplating?

Electroplating consists of depositing a thin layer of a metal on another, either for protection or for the sake of appearance. Electroplating is an electro-deposition process for producing a dense, uniform, and adherent coating, usually of metal or alloys, upon a surface by the act of electric current. The article is immersed in an aqueous solution (the bath) containing the required metal in an oxidized form, either as an aquated cation or as a complex ion. The coating produced is usually for decorative and/or protective purposes, or enhancing specific properties of the surface. The surface can be conductors, such as metal, or nonconductors, such as plastics. Electroplating products are widely used for many industries, such as automobile, ship, air space, machinery, electronics, jewelry, defense, and toy industries. The core part of the electroplating process is the electrolytic cell (electroplating unit).

Principles of Electroplating

In the electrolytic cell (electroplating unit) a current is passed through a bath containing electrolyte, the anode, and the cathode.



Electrolyte is the electrical conductor in which current is carried by ions rather

than by free electrons (as in a metal).

Electrolyte completes an electric circuit between two electrodes.

Upon application of electric current, the positive ions in the electrolyte will move toward the cathode and the negatively charged ions toward the anode. This migration of ions through the electrolyte constitutes the electric current in that part of the circuit. The migration of electrons into the anode through the wiring and an electric generator and then back to the cathode constitutes the current in the external circuit. The metallic ions of the salt in the electrolyte carry a positive charge and are thus attracted to the cathode. When they reach the negatively charged work piece, it provides electrons to reduce those positively charged ions to metallic form, and then the metal atoms will be deposited onto the surface of the negatively charged work piece.

The Purposes of Electroplating

Some of the purposes for which articles are electroplated are:

- (1) Appearance
- (2) Protection
- (3) Special surface properties
- (4) Engineering or mechanical properties

Uses of Electroplating

There are many applications of electroplating; some of them of increasing importance at present, in which neither corrosion prevention or decorative appeal is the reason for using a finish. Copper is an excellent conductor of electricity and is therefore basic to such items as printed circuits and communications equipment. Cans which are made from steel, are electroplated with tin. (This is safe for storing food).

Electroplating is generally done for two quite different reasons. Metals such as gold and silver are plated for decoration: it's cheaper to have gold- or silver-plated jewelry than solid items made from these heavy and expensive precious substances.

Car fenders and "trim," for example, were once widely made from tough [steel](#) plated with [chromium](#) to make them both attractively shiny and rust-resistant (inexpensive and naturally rustproof [plastics](#) are now more likely to be used on cars instead).

[Alloys](#) such as brass and bronze can be plated too, by arranging for the electrolyte to contain salts of all the metals that need to be present in the alloy.

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Reference links:

- <http://www.en.wikipedia.org/wiki/Cathode>
- <http://en.wikipedia.org/wiki/Electrolyte>
- <http://en.wikipedia.org/wiki/Corrosion>
- <http://www.chemistry.about.com/library/weekly/aa082003a.htm>

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