

Ошибка! Источник ссылки не найден. **Electroplating** is a process that uses electrical current to reduce dissolved metal cations so that they form a coherent metal coating on an electrode. Electroplating is primarily used to change the surface properties of an object (e.g. abrasion and wear resistance, corrosion protection, lubricity, aesthetic qualities, etc.), but may also be used to build up thickness on undersized parts or to form objects by electroforming.

The process used in electroplating is called **electrodeposition**. It is analogous to a galvanic cell acting in reverse. The part to be plated is the cathode of the circuit. In one technique, the anode is made of the metal to be plated on the part. Both components are immersed in a solution called an electrolyte containing one or more dissolved metal salts as well as other ions that permit the flow of electricity. A power supply supplies a direct current to the anode, oxidizing the metal atoms that comprise it and allowing them to dissolve in the solution. At the cathode, the dissolved metal ions in the electrolyte solution are reduced at the interface between the solution and the cathode, such that they "plate out" onto the cathode. The rate at which the anode is dissolved is equal to the rate at which the cathode is plated, vis-a-vis the current flowing through the circuit. In this manner, the ions in the electrolyte bath are continuously replenished by the anode. Other electroplating processes may use a non-consumable anode such as lead or carbon. In these techniques, ions of the metal to be plated must be periodically replenished in the bath as they are drawn out of the solution. The most common form of electroplating is used for creating coins such as pennies, which are small zinc plates covered in a layer of copper

Gold plating is a method of depositing a thin layer of gold on the surface of glass or metal, most often copper or silver. Gold plating is often used in electronics, to provide a corrosion-resistant electrically conductive layer on copper, typically in electrical connectors and printed circuit boards. With direct gold-on-copper plating, the copper atoms have the tendency to diffuse through the gold layer, causing tarnishing of its surface and formation of an oxide/sulfide layer. Gold is unique with its yellow color. Also, gold is a precious metal, which means that it will not oxidize in air, so its electrical conductivity stays uniform over long periods of time. It is ideally suited for gold electroplating applications. Gold plating offers good corrosion resistance, good solderability, and it has very good wear resistance. Metals may also be coated with gold for ornamental purposes, using a number of different processes

Silver plating **Ошибка! Источник ссылки не найден.**

A silver-plated, For applications in electronics, silver is sometimes used for plating copper, as its electrical resistance is lower more so at higher frequencies due to the skin effect. Variable capacitors are considered of the highest quality when they have silver-plated plates. Metals may also be coated with silver for ornamental purposes & caulinary items

Chrome plating is a finishing treatment utilizing the electrolytic deposition of chromium. The most common form of chrome plating is the thin, decorative *bright chrome*, which is typically a 10- μm layer over an underlying nickel plate. When plating on iron or steel, an underlying plating of copper allows the nickel to adhere. The pores (tiny holes) in the nickel and chromium layers also promote corrosion resistance. Bright chrome imparts a mirror-like finish to items such as metal furniture frames and automotive trim. Thicker deposits, up to 1000 μm , are called *hard chrome* and are used in industrial equipment to reduce friction and wear.

Nickel electroplating is a process that uses electrical current to reduce dissolved metal cations so that they form a coherent metal coating on an electrode. The term is also used for electrical oxidation of anions onto a solid substrate, as in the formation silver chloride on silver wire to make silver/silver-chloride electrodes. Electroplating is primarily used to change the surface properties. Electroplating is the most widely used method of nickel plating. Decorative bright nickel is used in a wide range of applications. It offers a high luster finish, corrosion protection, and wear resistance.

Surface preparation for nickel plating

Prior to plating operation the cathode surface should be cleaned from mineral oils, Rust protection oils, greases, paints, lubricants, fingerprints, miscellaneous solid particles, oxides, scale, smut & rust.

Copper & oxidations Copper's distinctive red-orange color and bright luster makes it appealing for decorative metalwork, jewelry and cookware. Oxidation occurs as a result of copper's exposure to air, though water, heat and acidic compounds can also induce corrosion. Oxidation adds a verdigris colour blue or green to copper or brass or bronze. This is especially true when contact with anything acidic in nature occurs. A new shiny piece of copper has a warm, shiny, orange-pink glow & through exposure to oxygen, it will begin to form a layer of black-brown oxide. The beautiful sheen of copper makes it a popular choice for both building and for art & craft. Unfortunately, copper can easily lose its luster and sheen to oxidation from the elements, especially when used outdoors. The solution to this problem is get it polished & lacquered properly by a professional electroplater to maintain its beauty throughout the life of the metal

Brass is an alloy made of copper and zinc; the proportions of zinc and copper. Brass is an alloy & is used for decoration for its bright gold-like appearance varieties of tone ranging from a pale lemon colour to a deep golden brown & properties of brass have made it the metal of choice for musical instruments & widely used for smaller objects in churches and for domestic use. In its newly cast state, brass takes on a shiny golden hue that can be polished to a brilliant glow. Without polishing or a protective lacquer coating, brass can tarnish through a process known as oxidation.

Bronze is principally an alloy of copper and tin dates from remote antiquity. The result is a metal of a rich golden brown colour, capable of being worked by casting. The density and hardness of the metal allowing it to mould to create ornamental work. Bronze has a brilliant shine while clean, but because of oxidation it can turn a slightly unappealing green. **Patina** is a tarnish that forms on the surface of copper, bronze and similar metals

Singapore atmosphere that causes oxidation & tarnish to metal

Singapore is surrounded by the sea & where the atmosphere contains salt, sulphuretted, moisture, air, acids, which causes many metals to oxidize, tarnish & rust that are chemically active elements. The problem with iron as well as many other metals is that oxidation takes place and the oxide formed does not firmly adhere to the surface of the metal causing it to flake off easily. This eventually causes structural weakness and disintegration of the metal. When a metal is attacked by substances around it, it is said to corrode and this process is called corrosion which causes deterioration of essential properties in a material.

All metals are subject to oxidization & it is the natural process of the metal returning to its base elements by combining with oxygen from the local atmosphere which frequently causes pitting in metals that use an oxide layer to protect themselves. Metals such as stainless steel tend to pit in seawater if the mechanism that maintains the film breaks down for any reason.

This also happens to copper, brass, bronze artifacts when exposed to air and water, it slowly gets tarnished by acquiring a thin green oxide layer. Similarly, silver quickly acquires a thin black oxide coating in moist air. & even the heaviest metal lead also tarnishes in moist weather. The black coating on silver and the green coating on copper are examples of corrosion in which the oxides formed strongly bond to the surface of the metal, preventing the surface from further exposure to oxygen and consequently slowing down corrosion.

The only solutions against these is to get your metal items protected & rejuvenates the color and luster on faded, dull metal by applying protective coating that will protect it from the damages the sun, salt air, acid rain & moisture without the effort of weekly polishing