Light Bulb

We revel in the beauty of what we see all around us. We admire flowers, see ourselves in the mirror, and consider ourselves lucky to have optical sensation. But we don’t always remember that it is light reflected from the surface of objects that enables us to see them. Pioneers of light technology like Sir Joseph Swan (1878) and Thomas Edison (1879) helped humankind switch its domestic and commercial light sources from oil lamps and candles to light bulbs.The technology in light bulbs has evolved since the time of Edison to include better quality incandescent bulbs, halogen bulbs, discharge bulbs, florescent bulbs, and so on. However, the ‘Edison caps’ are still used in certain bulbs, and most use the same simple materials and technology with a few variations and modifications. Light bulbs can be used for domestic purpose or commercial use, in cars, flashlights, and any form of business. Light bulbs can also be designed to emit colored light.Light bulbs are typically made of two metal links at the base of the glass (or quartz in case of halogen) bulb. When these metals come in contact with a running electric current or batteries (in flash lights), the electricity is transmitted to the filament. The bulb is filled with an inert gas like argon (premium gas like krypton can also be used) to prevent the filament from getting oxidized from contact with oxygen. The filament is made of a metal, tungsten, which has an exceptionally high melting point.The running electric current heats up the filament to a very high temperature (2,000 degrees Celsius) and the filament radiates excess energy as both heat and a large quantity of visible and invisible light. Light is thus a radiation or emission of excessive energy by atoms.The atoms in the filament, like all other atoms, have a nucleus, and electrons that revolve around the nucleus in different orbits. When the electrons are activated by surplus energy (by collision with other atoms due to high temperature in filament) they jump away from the nucleus to a different orbit of greater energy level.However, these artificially stimulated electrons are unstable and they emit excess energy in form of light energy, i.e., photons. Photons do not possess any mass, but have momentum and energy. The different techniques used to excite the atoms lead to the generation of different wavelengths, and hence, different colors of light. The presence of a gas enables the evaporated particles of the filament to bounce back to the filament.Light bulbs which are aging or in bad condition generally fuse when they are switched on. This is because a tungsten filament (especially those which are worn out or thinned out) has low resistance to electricity when it is cold. When the current is switched on the filament is still in the process of heating up and building resistance, and so the filament breaks and the bulb fuses.Most bulbs used for domestic purposes have a built-in fuse to prevent the main current from tripping. The filament thins out because sometimes, due to prolonged use, the high temperature in the filament results in the evaporation of the atoms. Despite the high light and energy efficiency of halogen and florescent bulbs, many people still favor the convectional incandescent bulbs because they are supposed to emit a warmer light.However, times have changed, and variously colored fluorescent and efficient halogen bulbs have come into the market. From power-saving bulbs that consume less electricity and give better outputs to those that are environmentally friendly, the market is full of options. Halogen bulbs are generally a little more expensive and, due to the premium gas in them, may be dangerous if not handled according to guidelines.

About the Author

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