

Wow, what a display!

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Who doesn't enjoy a relaxing afternoon on a day off watching one's favorite series on a wide HD screen! And if it's your sophisticated wide flat display, an add-on of a mug of caffè mocha with a yummy brunch will lead the lazy you to a lethargic couch.

Have you ever wondered about the technology responsible for turning the sporting moment of Cristiano Ronaldo kicking hat trick into a surrealistic in-ground emotion in your cosy comfy home? To your surprise it is the fourth state of matter, followed by solid, liquid and gas, which is serving you an in-theatre display quality. Yes, you got it right, it's the popular flat plasma display or your favorite plasma tv.

Let's unravel the technology behind one of the predominant large-format flat displays of the future.

Plasma is the fourth state of matter, which consists of a large number of electrically charged particles both negative (electrons) and positive (ions). To know more about Plasma, [read this article](#) by our content writer, *Dhaval Gadariya*.

These flat display panels collectively consist of a number of very small distinguished fluorescent-type lamps (small cells)

containing plasma inside. Hence, rightly called the Plasma Display Panel (PDP). Each of these lamps is a few tenths of millimetre in size. The tiny primary colour elements (red, green and blue) of light collectively form pixels. As we know that light cannot be seen but lighted objects can, similarly we can't witness the light directly emitted from the plasma but the light which is being reflected on the phosphor coated inner walls of cells while being exposed to UV (ultraviolet) radiation emitted by plasma. PDP is also known as emissive display as each cell emits its own light.

Are PDP and LCD similar? Well, in LCD (Liquid Crystal Display), light comes from a lamp (backlight) located behind the liquid crystal. This lamp is actually a plasma lamp instead of small cells. The mobility of light is being controlled by arrays of small switches on the liquid crystal. But both LCD and PDP are types of flat display.

Within a PDP, plasma is generated by the applied voltage across a gap that contains gas. Due to this applied voltage, the plasmas get heated up whereas on the contrary background gas comparatively remains at a lower temperature.

Emission of UV radiation occurs as a response to collision and energy transfer between relatively hotter electrons and gas atoms at the background.

A plasma display unit consists of two glass plates placed apart in parallel and sealed around the edges. The space between the plates which is of some tenths of a millimeter in width is filled with a mixture of gases at a pressure lower than 1 atm. Each plate is being deposited by a width of about a tenth of a millimeter with parallel stripes of a conducting material. Stripes on one plate are mutually perpendicular on the other plate. Voltages are applied on these stripes that act as electrodes. A high quality moving picture can be achieved by rapidly turning the plasma present in each individual cell on and off with the help of two electrodes located on one side of the cell and the third electrode on the opposite side. Before sealing, barriers are created on the inner surface of one of the plates to keep individual cells away from UV radiation as it is necessary to produce high quality color images.

PDP, the so-called latest cutting-edge display technique is not that latest. It was invented in the 1960s by researchers at University of Illinois, USA. Initially PDPs were available as monochrome (single color) displays. In the late 1990s, the first commercial color PDPs were made available. Since then, high quality large-format flat and wide displays are available in markets, yielding a new dimension to our audio-visual experience.

References:

1. Living with Plasmas (A Joint Project of IPR and NCSTC, 2017)
2. https://en.m.wikipedia.org/wiki/Plasma_display#/media/File%3APlasma-display-composition.svg