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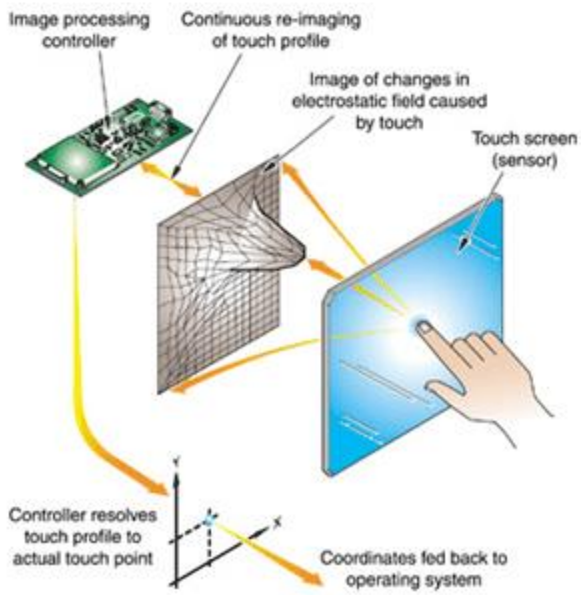
Chemistry DA

1>Short note on touch screen materials

A touch screen is a computer display screen that serves as an input device. When a touch screen is touched by a finger or stylus, it registers the event and sends it to a controller for processing.

A touch screen may contain pictures or words that the user can touch to interact with the device. A touch display module consists of a glass cover, touch layer(s) and a liquid crystal module or OLED display. To manufacture the most industrially common capacitive touch screen layers, you would deposit Indium Tin Oxide on a glass or PET (Polyethylene terephthalate) film and pattern it to create electrodes.
Other technologies for capacitive touch including silver nano wires and Carbon Nano Tubes are currently in R&D and require a printing method called lithography to manufacture.
Hence, the materials needed are glass or PET, a metal (Indium tin oxide or silver or CNT) and insulating film.



<the working of a touch screen>

2>Write in detail about different types and working principle of various digital display systems.

In totality there are majorly 3 kinds of digital display systems.

Plasma

Oled

Lcd

Plasma

A plasma display consists of millions of tiny cells filled with xenon and neon gas, held between two plates of glass. Lines of electrodes run beneath all the cells, and perpendicular lines of electrodes run above them, forming a basic grid. The plasma display controller charges the electrodes beneath and above the cell it needs to light up, and the current passing through the gas in the cell makes it glow. In many ways, it works just like a tiny fluorescent light. The controller lights up the cells each in turn, in a fraction of a second, too fast for the eye to see.

Oled

Organic light-emitting diode products are the newest digital display technology (at least, in consumer devices). You'll often see Oled displays marketed as AMOLED; the "AM" stands for "active matrix." That term describes how the pixels are addressed: how the display controller directs each subpixel to turn on or off, or to brighten or dim.

OLEDs create light via electroluminescence, utilizing a material that emits light when stimulated with electricity. The structure of an OLED display is very much like that of a plasma, only with thin layers of organic polymers instead of cells filled with gas. When current passes through the polymers, electrons give up energy as photons (light). Different polymers are used for red, green, and blue subpixels. As more voltage is applied to each subpixel, it becomes brighter; so, by varying the amount of voltage to the red, green, and blue subpixels, you can make a pixel display nearly any color.

LCD

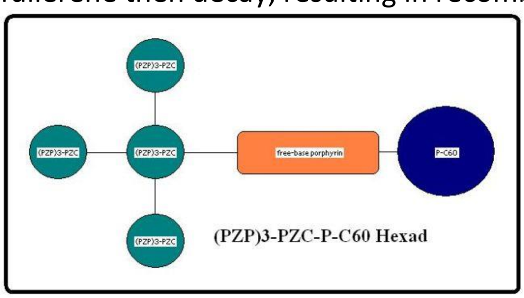
Liquid crystal displays make up the vast majority of HDTVs, desktop and laptop monitors, and tablet or cell phone displays. This basic technology has been around for a long time, and has greatly improved over the years. Many different types of LCDs are in use today, but only three major classes of LCD--twisted nematic, In-Plane Switching, and patterned vertical alignment

The principle behind the LCD's is that when an electrical current is applied to the liquid crystal molecule, the molecule tends to untwist. This causes the angle of light which is passing through the molecule of the polarized glass and also cause a change in the angle of the top polarizing filter. As a result, a little light is allowed to pass the polarized glass through a particular area of the LCD. Thus, that particular area will become dark compared to other. The LCD works on the principle of blocking light.

3>What is artificial photosynthesis? How artificial photosynthesis can be used to harvest solar energy?

If we could somehow artificially replicate the photosynthetic process completed by plants, we would be able to lower carbon dioxide concentrations in the atmosphere, while also producing sugar that we could use for food and energy production. The ultimate goal though is to take the natural process of photosynthesis and improve it, making it more efficient, absorbing more light, at a wider range of wavelengths, potentially even in the dark to produce more energy.

In artificial photosynthesis, scientists are essentially conducting the same fundamental process that occurs in natural photosynthesis but with simpler nanostructures. The fabrication of these nanostructures has only recently been possible due to breakthroughs in nanotechnology in the areas of imaging and manipulation. With the core processes in photosynthesis being light gathering, charge separation, and recombination, the goal of scientists has been to create efficient synthetic nanostructures that can function as antennae and reaction centers. Devens Gust and fellow researchers at Arizona State University created a hex ad, or six-part, nanoparticle made of four zinc tetraarylporphyrin molecules, $(P_{ZP})_3$-P_{ZC}, a free-base porphyrin, and a fullerene molecule, P-C_{60}.
When one of the three outer zinc porphyrins are excited by light energy, the energy is transferred through the central zinc porphyrin to the free-base porphyrin, which is connected to the fullerene. The energy causes the free-base porphyrin and fullerene to exist in an excited state where there is electron transfer and charge separation. The free-base porphyrin and fullerene then decay, resulting in recombination and an output of electrochemical energy.



4>Discuss on materials and manufacturing process of Optical fiber materials.

Optical fibers consist of 2 parts- an outer core and an inner cladding.

The core and the cladding are of the almost same material but the cladding have a lower refractive index that the core in order to enhance total reflection on the cladding of the light transmitted through the core.

They are two different classes of material that the fiber is made of: plastic and, mostly, glass.

Plastic fibers are usually made of polymers with silicon cladding, have a diameter of (usually) 1mm and they are used mainly for short distances, small networks and consumers items. Usually, they are multimode optical fibers.

Glass fibers are made mainly of silica glass (quartz). They are monomode (or singlemode) optical fibers and have very good transparency. The typical telecommunication fiber has a core diameter around 10µm and a total, including the cladding, of 125µm. They could be several hundreds of kilometers long. This is typically the optical fiber used in telecommunication networks and control systems, imaging optics etc.

Both the core and the cladding of an optical fiber are made of highly purified silica glass. An optical fiber is manufactured from silicon dioxide by either of two methods. The first, the crucible method, in which powdered silica is melted, produces fatter, multimode fibers suitable for short-distance transmission of many light wave signals. The second, the vapor deposition process, creates a solid cylinder of core and cladding material that is then heated and drawn into a thinner, single-mode fiber for long-distance communication.

There are three types of vapor deposition techniques: Outer Vapor Phase Deposition, Vapor Phase Axial Deposition, and Modified Chemical Vapor Deposition (MCVD). This section will focus on the MCVD process, the most common manufacturing technique now in use. MCVD yields a low-loss fiber well-suited for long-distance cables.