PRODUCT INFORMATION 2012

CLARIS

A new technology that transforms any piece of glass into a high definition display.

EXECUTIVE STRATEGY

Overview

Claris Electronics, a Florida-based limited liability company, has invented and patented a new technology that transforms any piece of glass into a high definition video screen called the Clar-View Display. The technology is based on using side-lighting and reflective salt crystals instead of traditional backlit light-emitting diode (LED). The technology is proven and fully functional prototypes are available for inspection and review.

The new Clar-View HD Screens provide a superior quality and lower cost solution for advertising displays in luxury retail showrooms, airports and billboard advertisements, and even citywide office building displays.

The Market

Clar-View will compete in the $220billion+ (USD) HD video screen market.

The current technologies in this vertical market include, LCD, Plasma, OLED and LED. These markets include:

1. Government/Military
2. Home Use/Residential
3. Corporate/Office
4. Advertising
5. Airports/Train Stations
6. Tablets/Phones
7. Sports/Entertainment

COMPETITION

Competition

As of the date of this release, no transparent, side lit video screens are available for retail sale to the public. However, OLED® was launched at the 2011 CES in Las Vegas, US. Since the Clar-View technology offers ultra hi-resolution, low manufacturing and material costs, extended lifespan and a transparent feature, it will be a natural competitor to the LCD, Plasma, LED and OLED technologies.

However based on our research, only Clar-View and OLED have the capability to produce a transparent screen, The transparent OLED technology was just recently showcased in January at the 2012 CES in Las Vegas and it is currently not available for retail sales.

Because Clar-View has inherent technological advantages over LCD, Plasma, OLED and LED the following overviews will contrast them with Clar-View's technology in the following categories:

- Material Costs, Manufacturing Costs and Retail Price Point
- Screen Resolution
- Lifespan
- Weight, Screen Size Capacity, Thickness Dimensions
- Transparency or lack of transparency qualities
- Power consumption

COMPETITION

Categories	Clar-View OLED LED-LCD LCD Plasma
Contrast Ratio	Clar-View: OLED: Not available LED-LCD: 5,000,000:1 Plasma: 5,000,000:1
Viewing Angle	LCD up to 160 degrees

Power Consumption (Ranking Lowest to hightest)

1. Clar-View
2. OLED
3. LED-LCD
4. LCD
5. Plasma

Lifespan (Ranking Longest to Shortest)

1. Clar-View estimated at 100,000 hours plus
2. LED TV offers around 100,000 hours vis-a-vis an LCD TV
3. LCD TV would last in the highest condition for around 75,000 hours
4. Panasonic plasma is estimated at 60,000 hours

Transparency — Only OLED and Clar-View can currently manufacture transparent screens

Largest Screen Size

108 inch LCD Sharp LCD $103,000
103 inch Plasma Panasonic: $46,000
80 inch Sharp LED-LCD - $5,000
55 inch OLED Samsung – Not Available for Retail Sale

Overview of OLED

An OLED (organic light-emitting diode) is a light-emitting diode (LED) in which the emissive electroluminescent layer is a film of organic compounds which emit light in response to an electric current. This layer of organic semiconductor material is situated between two electrodes. Generally, at least one of these electrodes is transparent.

- There are two main families of OLEDs: those based on small molecules and those employing polymers. Adding mobile ions to an OLED creates a Light-emitting Electrochemical Cell or LEC, which has a slightly different mode of operation. OLED displays can use either passive-matrix (PMOLED) or active-matrix addressing schemes. Active-matrix OLEDs (AMOLED) require a thin-film transistor backplane to switch each individual pixel on or off, but allow for higher resolution and larger display sizes.
- An OLED display works without a backlight. Thus, it can display deep black levels and can be thinner and lighter than a liquid crystal display (LCD). In low ambient light conditions such as a dark room an OLED screen can achieve a higher ratio than an LCD, whether the LCD uses cold cathode fluorescent lamps or the more recently developed LED backlight. Due to its low thermal conductivity, an OLED typically emits less light per area than an inorganic LED.
- OLEDs are used in television screens, computer monitors, small, portable system screens such as mobile phones and PDAs, watches, advertising, information, and indication. OLEDs are also used in large-area light-emitting elements for general illumination.

Drawbacks of OLED

- Current costs: OLED manufacture currently requires process steps that make it extremely expensive. Specifically, it requires the use of Low-Temperature Polysilicon backplanes; LTPS backplanes in turn require laser annealing from an amorphous silicon start, so this part of the manufacturing process for AMOLEDs starts with the process costs of standard LCD, and then adds an expensive, time-consuming process that cannot currently be used on large-area glass substrates.

COMPETITION

- Lifespan: The biggest technical problem for OLEDs was the limited lifetime of the organic materials. In particular, blue OLEDs historically have had a lifetime of around 14,000 hours to half original brightness (five years at 8 hours a day) when used for flat-panel displays. This is lower than the typical lifetime of LCD, LED or PDP technology—each currently rated for about 25,000–40,000 hours to half brightness, depending on manufacturer and model.

- Color Balance Issues: Additionally, as the OLED material used to produce blue light degrades significantly more rapidly than the materials that produce other colors, blue light output will decrease relative to the other colors of light. This variation in the differential color output will change the color balance of the display and is much more noticeable than a decrease in overall luminance. This can be partially avoided by adjusting color balance but this may require advanced control circuits and interaction with the user, which is unacceptable for some users. In order to delay the problem, manufacturers bias the color balance towards blue so that the display initially has an artificially blue tint, leading to complaints of artificial-looking, over-saturated colors. More commonly, though, manufacturers optimize the size of the R, G and B sub pixels to reduce the current density through the sub pixel in order to equalize lifetime at full luminance. For example, a blue sub pixel may be 100% larger than the green sub pixel. The red sub pixel may be 10% smaller than the green.

- Poor Efficiency of Blue OLEDs: Improvements to the efficiency and lifetime of blue OLEDs is vital to the success of OLEDs as replacements for LCD technology. Considerable research has been invested in developing blue OLEDs with high external quantum efficiency as well as a deeper blue color. External quantum efficiency values of 20% and 19% have been reported for red (625 nm) and green (530 nm) diodes, respectively. However, blue diodes (430 nm) have only been able to achieve maximum external quantum efficiencies in the range of 4% to 6%.

- Water Damage: Water can damage the organic materials of the displays. Therefore, improved sealing processes are important for practical manufacturing. Water damage may especially limit the longevity of more flexible displays.

KEY BENEFITS

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CLARIS

KEY BENEFITS

- When not in use, the ClarView screen is fully transparent like a glass window
- Manufacturing cost for ClarView are less than the costs for manufacturing an LCD, Plasma and OLED screens
- Material cost for ClarView are less than LCD, Plasma and OLED screens
- ClarView screens function in extreme temperatures
- The amortized cost of a ClarView screen is a fraction of an LCD, or Plasma because of it's estimated 10,000 hour life span. (See Westinghouse lab testing)
- Does not require view to be center due to wide viewing angle
- Screen has a lower electrical demand than comparable LCD, Plasma and OLED screens
- Screen is lightweight and 70% recyclable being made of glass, acrylic and sea salt. Fully and completely able to reconstitute 70% of the raw materials for re-use.

Key Features

- Screen is not back lit, so it allows for full transparency when there is no image on the screen or screen is turned off
- 1080p HD screen resolution (1920 x 1080)
- Life span up to an estimated 100,000 hours of use
- Screen functions at temperatures up to 180 degrees Fahrenheit and as cold as 10 below zero Fahrenheit.
- Screen can be built without the components integrated into the frame and instead components can be remotely connected to the screen by a cable
- Wide viewing angle approaching 180 degrees
- Screen can be fabricated into any shape
- Screen dimensions sizes up to 110 inches in diameters
- Screen is lightweight and made with scratch resistant acrylic

KEY BENEFITS

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KEY BENEFITS

Claris Electronics' Clar-View technology has a number of key benefits over traditional displays including:

- Transparent when a polarizer is not in use and can function as a traditional glass window.
- Manufacturing and material costs are substantially less than for LCD, Plasma and OLED screens.
- Capable of producing a high definition image (1080p High Definition resolution)
- Capable of producing an image while remaining fully transparent(creating a holographic 3D effect, white is perceived as transparent)
- Able to operate in extreme temperatures, making the units perfect for year-round outdoor advertisement displays
- Substantially longer life span than LCD, Plasma or OLED (100,000+ hour life span proven in Westinghouse lab testing)
- Significantly lower electrical demand than comparable LCD, Plasma and OLED screens
- Lightweight and 70% Recyclable
- 180 degree viewing angle
- Fully scalable from a cell phone screen to the size of an entire building

HOW IT WORKS

PRODUCT INFORMATION 2012

CLARIS

HOW IT WORKS

How It Works

Clar-View works by side-lighting a patented acrylic panel that bends light at 90 degrees and pushes it through illuminated color pixels made from the patented mineral mixture. To the human eye, there is no distinction between these color images and the color images produced by a standard video screen or television. Hence, Clar-View can we watched like any other video screen when it is on and receiving voltage and can act like a standard window or semi-transparent screen in the off position.

Our Patents

The present invention is broadly directed to a display system based upon a pixel element, which glows in different colors when different electrical voltages and/or currents are applied to the element. The element may also glow white under appropriate conditions or appear black with no power applied.

In the preferred embodiment is salt-based. Sodium chloride or other salts or salt-based materials may be used. A metal or other substance such as tin may be used to enhance conduction and/or other electrical properties of the element.

The material used to form the pixel element is processed according to the invention to form a network of microscopic cracks or fissures. In the preferred embodiments, thermal cycling is used. A source of light may be used behind the pixel element to enhance the color in which the pixel element glows.

HOW IT WORKS

To form a display, a plurality of pixel elements are arranged in rows and columns interconnected with horizontal and vertical electrodes. The horizontal and vertical electrodes may themselves be composed of a salt-based material. If salt-based, a metal or other substance such as tin may be used to enhance conduction and/or other electrical properties of the electrodes.

Video processing electronics are used to receive a video signal and control the horizontal and vertical electrodes to display a video image on the rows and columns of the pixel elements.

COMPETITION

- Outdoor Performance: As an emissive display technology, OLEDs rely completely upon converting electricity to light, unlike most LCDs which are to some extent reflective; e-ink leads the way in efficiency with ~ 33% ambient light reflectivity, enabling the display to be used without any internal light source. The metallic cathode in an OLED acts as a mirror, with reflectance approaching 80%, leading to poor readability in bright ambient light such as outdoors. However, with the proper application of a circular polarizer and anti-reflective coatings, the diffuse reflectance can be reduced to less than 0.1%. With 10,000 fc incident illumination (typical test condition for simulating outdoor illumination), that yields an approximate photopic contrast of 5:1.

- Power consumption: While an OLED will consume around 40% of the power of an LCD displaying an image which is primarily black, for the majority of images it will consume 60–80% of the power of an LCD: however it can use over three times as much power to display an image with a white background such as a document or website. This can lead to reduced real-world battery life in mobile devices.

- Screen Burn-in: Unlike displays with a common light source, the brightness of each OLED pixel fades depending on the content displayed. The varied lifespan of the organic dyes can cause a discrepancy between red, green, and blue intensity. This leads to image persistence, also known as burn-in.

- UV sensitivity: OLED displays can be damaged by prolonged exposure to UV light. The most pronounced example of this can be seen with a near UV laser (such as a Blu-ray pointer) and can damage the display almost instantly with more than 20 mW leading to dim or dead spots where the beam is focused. This is usually avoided by installing a UV blocking filter over the panel and this can easily be seen as a clear plastic layer on the glass. Removal of this filter can lead to severe damage and an unusable display after only a few months of room light exposure.

Overview of LCDs

LCD televisions produce a black and colored image by selectively filtering a white light. The light is typically provided by a series of cold cathode fluorescent lamps (CCFLs) at the back of the screen, although some displays use white or colored LEDs instead. Millions of individual LCD shutters arranged in a grid, open and close to allow a metered amount of the white light through. Each shutter is paired with a colored filter to remove all but the red, green or blue (RGB) portion of the light from the original white source. Each shutter–filter pair forms a single sub-pixel. The sub-pixels are so small that when the display is viewed from even a short distance, the individual colors blend together to produce a single spot of color, a pixel. The shade of color is controlled by changing the relative intensity of the light passing through the sub-pixels.

Liquid crystals encompass a wide range of (typically) rod-shaped polymers that naturally form into thin layers, as opposed to the more random alignment of a normal liquid. Some of these, the nematic liquid crystals, also show an alignment effect between the layers. The particular direction of the alignment of a nematic liquid crystal can be set by placing it in contact with an alignment layer or director, which is essentially a material with microscopic grooves in it. When placed on a director, the layer in contact will align itself with the grooves, and the layers above will subsequently align themselves with the layers below, the bulk material taking on the director's alignment. In the case of an LCD, this effect is utilized by using two directors arranged at right angles and placed close together with the liquid crystal between them. This forces the layers to align themselves in two directions, creating a twisted structure with each layer aligned at a slightly different angle to the ones on either side.

LCD shutters consist of a stack of three primary elements. On the bottom and top of the shutter are polarizer plates set at right angles. Normally light cannot travel through a pair of polarizers arranged in this fashion, and the display would be black. The polarizers also carry the directors to create the twisted structure aligned with the polarizers on either side. As the light flows out of the rear polarizer, it will naturally follow the liquid crystal's twist, exiting the front of the liquid crystal having been rotated through the correct angle that allows it to pass through the front polarizer. LCDs are normally transparent.

To turn a shutter off, a voltage is applied across it from front to back. The rod-shaped molecules align themselves with the electric field instead of the directors, destroying the twisted structure. The light no longer changes polarization as it flows through the liquid crystal, and can no longer pass through the front polarizer. By controlling the voltage applied across the crystal, the amount of remaining twist can be selected. This allows the transparency of the shutter to be controlled. To improve switching time, the cells are placed under pressure, which increases the force to re-align themselves with the directors when the field is turned off.

Several other variations and modifications have been used in order to improve performance in certain applications. In-Plane Switching displays (IPS and S-IPS) offer wider viewing angles and better color reproduction, but are more difficult to construct and have slightly slower response times. IPS displays are used primarily for computer monitors. Vertical Alignment (VA, S-PVA and MVA) offer higher contrast ratios and good response times, but suffer from color shifting when viewed from the side. In general, all of these displays work in a similar fashion by controlling the polarization of the light source.
In spite of LCDs being a well-proven and still viable technology, as display devices LCDs are not perfect for all applications.

Advantages

- Very compact and light.
- Low power consumption.
- No geometric distortion.
- Little or no flicker depending on backlight technology.
- Not affected by screen burn-in.
- Can be made in almost any size or shape.
- No theoretical resolution limit.

Disadvantages

- Limited viewing angle, causing color, saturation, contrast and brightness to vary, even within the intended viewing angle, by variations in posture.
- Bleeding and uneven backlighting in some monitors, causing brightness distortion, especially toward the edges.
- Smearing and ghosting artifacts caused by slow response times (>8 ms) and "sample and hold" operation.
- Only one native resolution. Displaying resolutions either requires a video scaler, lowering perceptual quality, or display at 1:1 pixel mapping, in which images will be physically too large or won't fill the whole screen.
- Fixed bit depth, many cheaper LCDs are only able to display 262,000 colors. 8-bit S-IPS panels can display 16 million colors and have significantly better black level, but are expensive and have slower response time.
- Low bit depth results in images with unnatural or excessive contrast.
- Input lag
- Dead or stuck pixels may occur during manufacturing or through use.
- In a constant-on situation, thermalization may occur, which is when only part of the screen has overheated and looks discolored compared to the rest of the screen.
- Not all LCDs are designed to allow easy replacement of the backlight.
- Cannot be used with light guns/pens.
- Loss of contrast in high temperature environments

COMPETITION

Overview of Plasma

Plasma displays are bright (1,000 lux or higher for the module), have a wide color gamut, and can be produced in fairly large sizes—up to 150 inches (3.8 m) diagonally. They have a very low-luminance "dark-room" black level compared to the lighter grey of the unilluminated parts of an LCD screen (i.e. the blacks are blacker on plasmas and greyer on LCDs). LED-backlit LCD televisions have been developed to reduce this distinction. The display panel itself is about 6 cm (2.5 inches) thick, generally allowing the device's total thickness (including electronics) to be less than 10 cm (4 inches).

Plasma displays use as much power per square meter as a CRT or an AMLCD television. Power consumption varies greatly with picture content, with bright scenes drawing significantly more power than darker ones – this is also true of CRTs. Typical power consumption is 400 watts for a 50-inch (127 cm) screen. 200 to 310 watts for a 50-inch (127 cm) display when set to cinema mode. Most screens are set to 'shop' mode by default, which draws at least twice the power (around 500–700 watts) of a 'home' setting of less extreme brightness. Panasonic has greatly reduced power consumption ("1/3 of 2007 models") Panasonic states that PDPs will consume only half the power of their previous series of plasma sets to achieve the same overall brightness for a given display size.

The lifetime of the latest generation of plasma displays is estimated at 100,000 hours of actual display time, or 27 years at 10 hours per day. This is the estimated time over which maximum picture brightness degrades to half the original value.

Plasma display screens are made from glass, which reflects more light than the material used to make an LCD screen. This causes glare from reflected objects in the viewing area. Companies such as Panasonic coat their newer plasma screens with an anti-glare filter material. Currently, plasma panels cannot be economically manufactured in screen sizes smaller than 32 inches. Although a few companies have been able to make plasma Enhanced-definition televisions (EDTV) this small, even fewer have made 32in plasma HDTVs. With the trend toward large-screen television technology, the 32in screen size is rapidly disappearing. Though considered bulky and thick compared to their LCD counterparts, some sets such as Panasonic's Z1 and Samsung's B860 series are as slim as one inch thick making them comparable to LCDs in this respect.

COMPETITION

Advantages

- Picture quality
  - Capable of producing deeper blacks allowing for superior contrast ratio
  - Wider viewing angles than those of LCD; images do not suffer from degradation at high angles like LCDs
  - Less visible motion blur, thanks in large part to very high refresh rates and a faster response time, contributing to superior performance when displaying content with significant amounts of rapid motion (though newer LCD screens have similar refresh rates, but that also introduces the soap opera effect).

Disadvantages

- Picture quality
  - Earlier generation displays were more susceptible to screen burn-in and image retention, recent models have a pixel orbiter that moves the entire picture faster than is noticeable to the human eye, which reduces the effect of burn-in but does not prevent it.
  - Earlier generation displays (circa 2006 and prior) had phosphors that lost luminosity over time, resulting in gradual decline of absolute image brightness (newer models may be less susceptible to this, having advertised lifespans exceeding 100,000 hours, far longer than older CRT technology)
  - Screen-door effects are noticeable on screen sizes smaller than 50in, effect is more visible at shorter viewing distances.

Other

- Use more electricity, on average, than an LCD TV.
- Do not work as well at high altitudes due to pressure differential between the gases inside the screen and the air pressure at altitude. It may cause a buzzing noise. Manufacturers rate their screens to indicate the altitude parameters.
- For those who wish to listen to AM radio, or are Amateur Radio operators (Hams) or Shortwave Listeners (SWL), the Radio Frequency Interference (RFI) from these devices can be irritating or disabling.
- Due to the strong infrared emissions inherent with the technology, standard IR repeater systems cannot be used in the viewing room. A more expensive "plasma compatible" sensor must be used.

HOW IT WORKS

PROPERTIES OF HD™ CLARVIEW ACRYLIC SCREEN

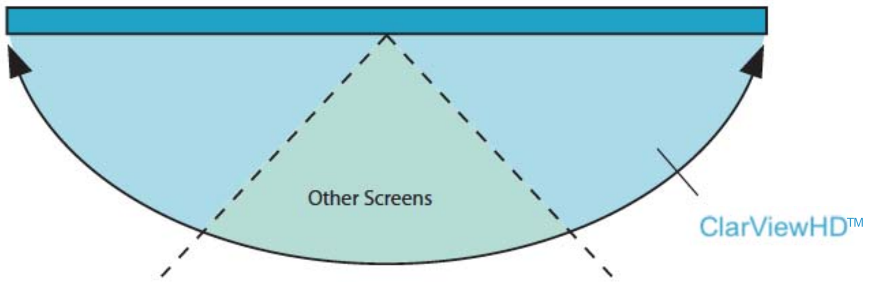
TYPICAL PROPERTY (ASTM STANDARD)	UNITS	Clarview
MECHANICAL		
Tensile Modulus (D638)	psi	440,000-480,000
Yield Stress (D638)	psi	10,000-11,000
Flexural Modulus (D790)	ft-lb/ 1/2" by 1" section	440,000-480,000
Impact Properties (Izod, milled notch, 73 F) (D256)	ft-lb/in of notch -	0.3-0.35
OPTICAL		
Half gain angle	Degrees	>30
Transmission	%	>60%
Gloss		
20 Degrees	-	>80
60 Degrees	-	>87
85 Degrees	-	99
MISCELLANEOUS		
Specific Gravity (D792)		1.19
Rockwell Hardness (M-scale) (D785)	-	90

STANDARD OFFERING

THICKNESS
0.236 "
0.236"

SHEET SIZE
81" x 144"
48" x 86"

VIEWING ANGLES



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