



Electrochromic displays guidebook

Things alive

ynvisible's vision is to bring everyday objects and surfaces to life, benefitting people in a smart and connected world.

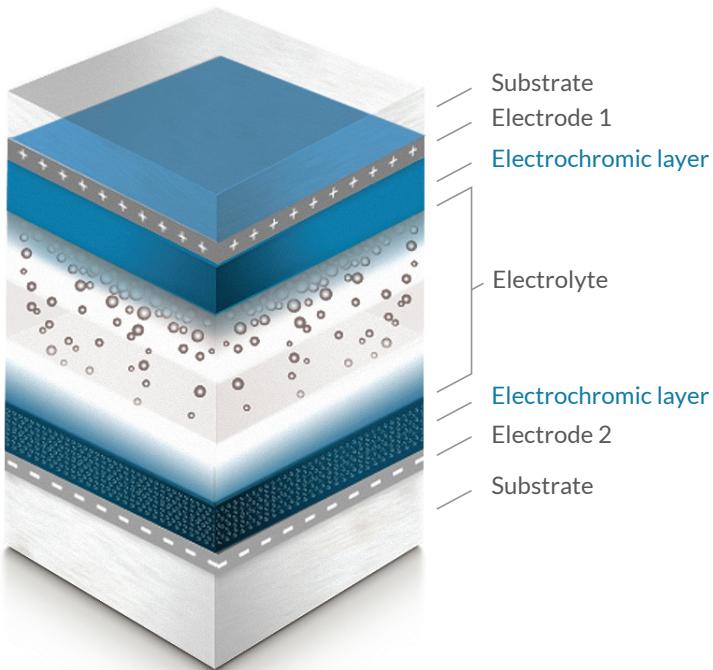
ynvisible's mission is to provide a practical human interface to the Internet of Things as it becomes the Internet of Everything.

ynvisible has developed and brought to market proprietary printed electrochromic (EC) displays that are low power, low weight, thin, flexible, transparent and robust. Based on a printed multi-layer architecture, ynvisible's displays can be combined with inks and electronics into integrated systems.

When combined with various sensors (e.g. movement, touch, temperature or proximity) ynvisible displays bring functionality and life to smart products and can be easily integrated in high volume, e.g. into smart, interactive labels for packaging and CPG products.

Vertical electrochromic displays

1.1 Display structure



Vertical electrochromic displays

1.2 How it works

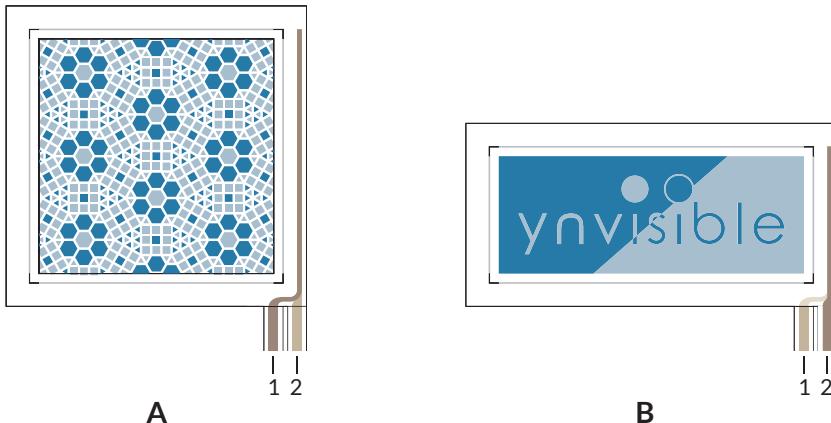


Figure 1: Vertical electrochromic displays

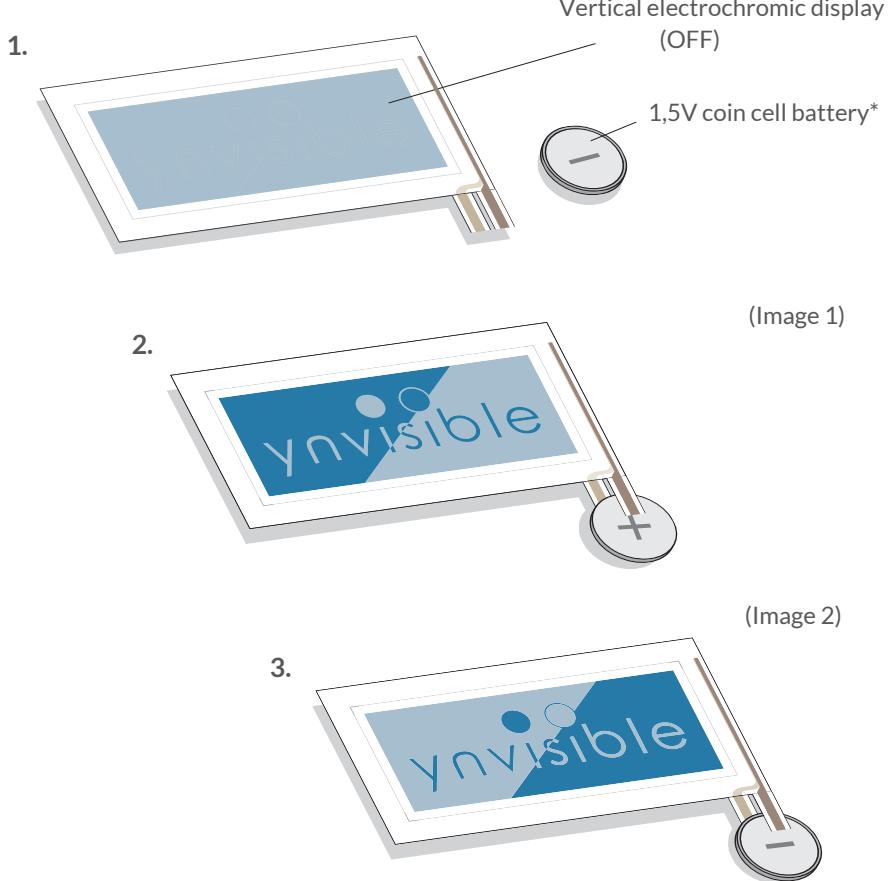
Vertical electrochromic displays have two electrodes, electrode 1 (E1) and electrode 2 (E2), as shown in Figure 1. The display can be activated by applying a voltage level of 1.5 V to one of the electrodes, while keeping the other one tied to ground (GND). Table 1 summarizes the results while applying the different voltages across the two pins of the display.

E1	E2	Result
GND	GND	OFF
1,5V	1,5V	OFF
GND	1,5V	Image 1 will be activated
1,5V	GND	Image 2 will be activated

Table 1: Expected results when applying voltage to the pins of the electrochromic display

Vertical electrochromic displays

1.3 Activation example with 1,5V coin cell battery

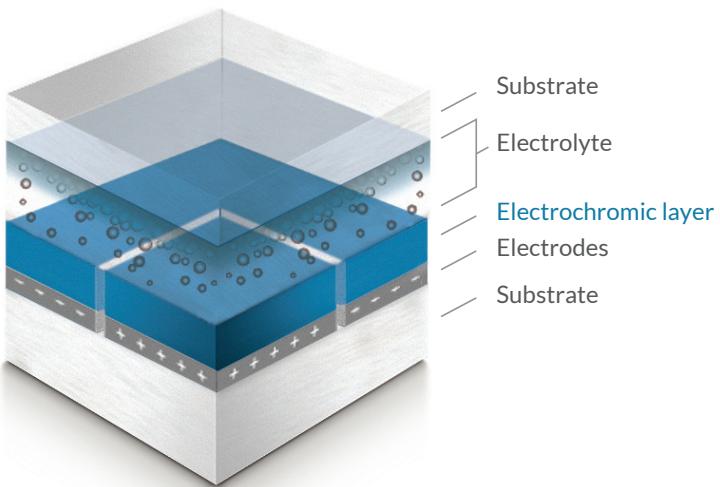


*In order to easily connect the display contacts to the both sides of the coin cell, please use a coin cell battery with thin thickness (around 2mm). In case you need to purchase these coin cells, you can order them from the links below (suggestions):

- <http://tinyurl.com/h3w88z7> (amazon)
- <http://tinyurl.com/h4kdc6l> (amazon)

Coplanar electrochromic displays

2.1 Display structure



Coplanar electrochromic displays

2.2 How it works

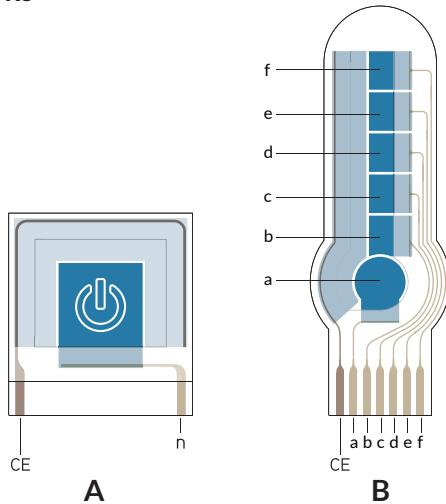


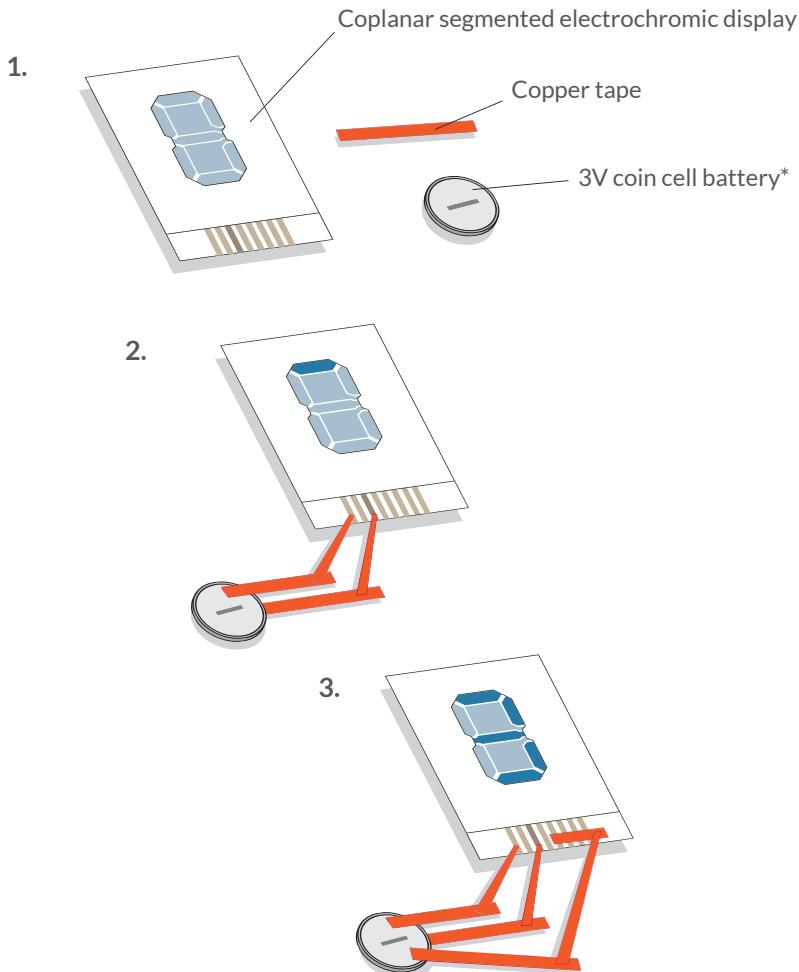
Figure 2: Coplanar electrochromic displays

In order to activate a specific area of a coplanar display, a voltage level of 3V must be applied to the counter electrode (CE), while keeping the contact connected to the other pertinent electrode tied to ground (GND).

Segmented electrochromic coplanar displays can have several contacts, as shown in Figure 2A and 2B, with one of them being the counter electrode (CE) and the rest electrodes specific to each segment.

Coplanar electrochromic displays

2.3 Activation example with 3V coin cell battery



*Suggestions for buying 3V coin cells:
- <http://tinyurl.com/zpa3fmw> (ebay)
- <http://tinyurl.com/zgtfhff> (amazon)

Irreversible electrochromic displays

1.1 How it works

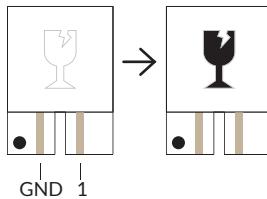


Figure 3: Vertical structure

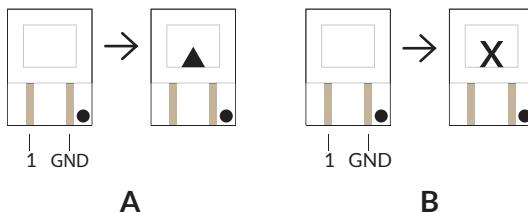


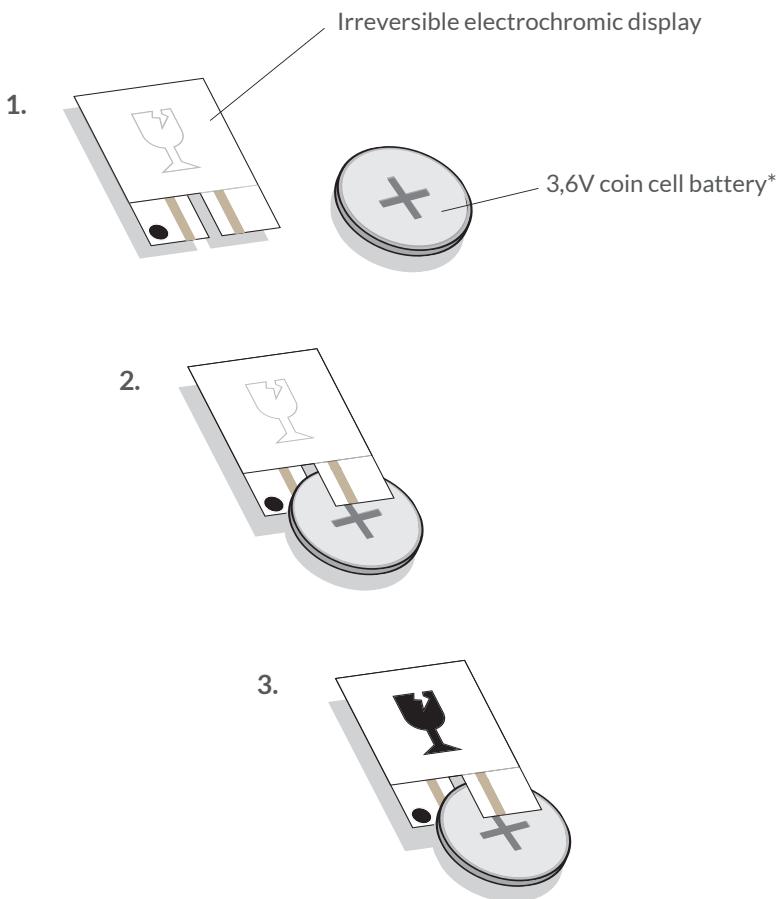
Figure 4: Coplanar structure

Irreversible electrochromic displays can only be activated once. After activation, the patterned image will turn from a transparent state to a permanent black color.

In order to activate the segments of the irreversible electrochromic displays shown in Figures 3 and 4, a 4V voltage should be applied between the two contacts of the irreversible display. Irreversible displays can be activated with lower voltage, but this may increase transition time.

Irreversible electrochromic displays

3.2 Activation example with 3,6V coin cell battery



*Suggestions for buying 3,6V coin cells:
- <http://tinyurl.com/hqk8uyn> (ebay)
- <http://tinyurl.com/jgskfwr> (amazon)

Disclaimer

Requestor acknowledges that ynvisible has agreed to deliver the electrochromic display samples for evaluation purposes only. Requestor therefore acknowledges that it shall not resell nor transfer any of the provided electrochromic display samples to any third parties, without ynvisible's prior consent. Requestor also agrees that it shall not reverse engineer, reverse assemble, analyze the composition or decompile, as applicable, any of the electrochromic display samples or its constituent materials. Requestor further acknowledges that ynvisible has no obligations whatsoever to repair, replace or service the electrochromic display samples in any manner or to provide Requestor with any future upgrades to the samples, if any. Requestor is solely responsible for the use of the electrochromic display samples in any applications, including those of an experimental nature. If requested by ynvisible, Requestor shall provide all testing results of such evaluations.

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