

GMO Detective



Hardware Guide:

The Hardware guide will help you to gather, buy and build all the materials you need to do the experiments. This consists of reusable devices such as the open hardware fluorescence detector and also consumables which are used with each experiment.

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Reusables

Makabales

Files for PCB and Laser cutter:

https://gmodetective.com/wp-content/uploads/2018/10/GMOdetective_Hardware_FilesV0.1.zip

a. Open Hardware Detector

This is a cheap DIY fluorescence detector. It is easy to build and use. A buyable version should be available soon. You will need to know how to solder as well as a soldering iron, 15x15cm 3mm plexiglass/wood, a laser cutter and the following parts:

1 PCB	https://www.pcbway.com The file is in eagle format (free for students) We can also send you some :)
8 5mm blue LEDs 470nm	https://www.mouser.com/?Keyword=C503B-BAN-CZ0A0451
8 68/100 ohms resistors	https://www.mouser.com/?Keyword=CFR-25JT-52-68R
1 Capacitor 10 F	https://www.mouser.com/?Keyword=ECA-1JM100B
1 Fuse 0,5 A	https://www.mouser.com/?Keyword=RXEF025

Orange Filters	179 Chrome Orange ; http://www.leefilters.com/lighting/colour-details.html#179
Blue Filter	716 Mikkel Blue : http://www.leefilters.com/lighting/colour-details.html#716

Solder the parts onto the PCB

Laser-cut the legs tube holder and front panel

Slide the PCB into the Legs

Then attach front panel and top tube holder.

Slide 1.5x11cm blue filter into leg side slits, and 2 orange filters into the small space between the legs and front panel so you see orange through the view hole

Connect to a 5v power source (USB).

b. Holders

Laser-cut the legs and tube holder and connect

Buyable or makeable or hackable

Common materials anyone probably has:

You will need a mug or beaker to hold boiling water for 5 minutes during the sample prep, anything that can hold coffee or tea will do.

Aluminum foil to hold the tubes in place.

Permanent waterproof markers too, so you know what is what :)

Stable heating:

We need something that can keep a stable 63°C

If you have a PCR machine/heat block/Scientific water bath then these will all be perfect.

Otherwise these portable sous vide vacuum cookers are perfect and affordable, and you can also experiment with new ways of cooking!

<https://www.aliexpress.com/item/Vacuum-Slow-Sous-Vide-Precision-Food-Cooker-1500W-Powerful-Immersion-Circulator-LCD-Digital-Timer-Display-Stainless/32869232621.html?spm=a2g0s.8937460.0.0.302d2e0eDrMWuV>

Or

<https://anovaculinary.com/>

Or

You can also make one yourself!

<https://www.instructables.com/howto/sous+vide/>

<https://www.instructables.com/id/DIY-Sous-Vide-Machines/>

20 μ L Pipettes

Buy:

<https://www.aliexpress.com/item/2-20ul-Single-Channel-Adjustable-Micro-Pipette-Transfer-Pipette-Lab-Pipettor-Buy-1-Pipette-Give-50pcs/32814661287.html>

Consumables

These you will need to buy. Every experiment needs:

~4 1.5mL tubes

1 PCR strip

2 Pestles

2 gloves

And ~10 tips

1,5 mL microtubes	https://www.aliexpress.com/item/1-5ml-Clear-plastic-centrifugal-test-tube-Sample-vial-with-snap-cap-for-samples-food-colourings/32694400420.html?spm=a2g0s.9042311.0.0.3da24c4dcV9Hma
PCR 8 tube Strips	https://www.aliexpress.com/item/200PCS-4ml-Centrifuge-Bottles-Test-Tube-With-Lid-Calibration-Round-Bottom-Seed-Container-Laboratory-Supplies-1500r/32708099906.html?spm=a2g0s.9042311.0.0.3da24c4dcV9Hma
micropestles	https://www.aliexpress.com/item/50-pcs-lot-5mm-70mm-Polypropylene-Pestle-grinding-PP-rod-tip-for-1-5ml-centrifuge-tube/32762070308.html?spm=2114.search0104.3.2.2ee51276oXfHhu&ws_ab_test=searchweb0_0,searchweb201602_3_10152_10151_10065_10344_10068_10342_10343_10340_10341_10696_310_10084_10083_10618_10304_10307_10820_10821_10302_10843_10059_100031_10103_10624_10623_10622_10621_10620_526,searchweb201603_13,ppcSwitch_5&algo_expid=9a04db14-5032-4917-9edd-e21168868e7b-0&algo_pvid=9a04db14-5032-4917-9edd-e21168868e7b&priceBeautifyAB=0

Pipet Tips	https://www.aliexpress.com/item/New-200ul-PP-Plastic-Pipette-Tips-For-Microbiological-Test-Pipettor-Yellow-Pipet-Tips-Disposable-Pipette-Tip/32523839777.html?spm=2114.10010108.1000014.1.6f52221cD5FWBa&gps-id=pcDetailBottomMoreOtherSeller&scm=1007.13338.107646.0000000000000000&scm_id=1007.13338.107646.0000000000000000&scm-url=1007.13338.107646.0000000000000000&pvid=982c463a-c9c4-40ca-9c91-248ec5df68f3
Pipet Tips in Box	https://www.aliexpress.com/item/Free-shipping-Plastic-Pipette-box-96vents-box-96pcs-200ul-yellow-pipette-tips/32595675105.html?spm=2114.10010108.1000013.1.4569761fll1muL&gps-id=pcDetailBottomMoreThisSeller&scm=1007.13339.90158.0&scm_id=1007.13339.90158.0&scm-url=1007.13339.90158.0&pvid=96b5e6cb-d67c-4218-96ed-4ef542c1ffcf
gloves	https://www.aliexpress.com/item/3-Sizes-High-Quality-1box-A-lot-powder-free-Nitrile-Disposable-glove-latex-Gloves-non/32845058449.html?spm=2114.10010108.1000014.16.766c662dBopRhD&gps-id=pcDetailBottomMoreOtherSeller&scm=1007.13338.106568.0000000000000000&scm_id=1007.13338.106568.0000000000000000&scm-url=1007.13338.106568.0000000000000000&pvid=efecf868-310e-4497-8515-7c37fae82025