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Microfluidic channels wax priming

Jorge Fernández[1], Manuela de las Casas[1]

[1]Universidad Complutense de Madrid

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Jorge Fernández

ABSTRACT

Procedure for printing microfluidic hydrophobic channels in nitrocellulose membranes.

This protocol depicts the steps for easily printing wax channels using plastic stamps and molten wax.

GUIDELINES

Nitrocellulose membranes that will furtherly used for analytical purposes must be handled with gloved hands.

The following protocol uses, pressure and heat for creating wax channels in microfluidic membranes. If the membranes are going to be used for flow assays, pressure applied must be mild, in order to avoid changing the microscopic structure of the pores.

MATERIALS

NAME	CATALOG #	VENDOR
Glass Petri dishes 90 x 15 cm		
nitrocellulose membrane sheets size 210 m × 297 mm thickness 200 µm	Whatman® FF170HP Din A	Sigma Aldrich
Wax crayons (non water-soluble)	View	
Whatman® FF80HP Din A4	FF80HP DIN A4 10/pk	

MATERIALS TEXT

- Laboratory Thermoblock or a thermostatized hot plate
- 3d Printed plastic Stamps

BEFORE STARTING

Pre-heat a thermoblock at 105 ºC.
Cut previously a nitrocellulose membranes with the proper dimensions required.

1 Set the hot plate to 105ºC or at least warm enough to melt the wax. Cut a small amount from one of the wax pencils and place it on a Petri dish. Set the Petri dish on the hot plate and wait for the wax to melt.

2 Cut to their appropiate size the nitrocellulose pieces to prime with the designed microfluidic path.

3 Once the wax is perfectly melted, take the plastic stamp and wet their sealing ends by immersion for 1-2 seconds in the molten wax. Lift the stamp and observe that the stamping surface is fully covered in wax.

4 As fast as possible place the stamp against the membrane, in order to release the wax on the surface of the nitrocellulose membrane. Apply mild pressure for 2-5 seconds, and lift the stamp.

It is possible that the membrane goes up wtith the stamp. In that case, touch softly the outer region of the sealed membrane in order to detacht it from the stamp.

5 Cover the nitrocellulose strip with plastified paper that protects the membrane (one sheet on top, another underneath). Place the sandwich on the hot place with a Petri dish on top (this is just to apply soft pressure, any temperature-resistant flat object is valid here). Allow the strip to warm for 5 minutes. This will allow the wax to penetrate all through the strip.

6 Remove the strip from the hot plate and let it cool down again. You should see the shape of the channel wax primed on the membrane. Ussually it is vissible a thin "white shadow" near the border of the wax imprimation, that represents the limit of the primed channel. If the channel is not wide enough, or it is not uniform, consider repeating the procedure.