

Printing metamaterials layer by layer by dripping drops on a elastomer

Author: Matías Concha

Mentor: Claudio Falcón

MOTIVATION

Accelerate the production of metamaterials.

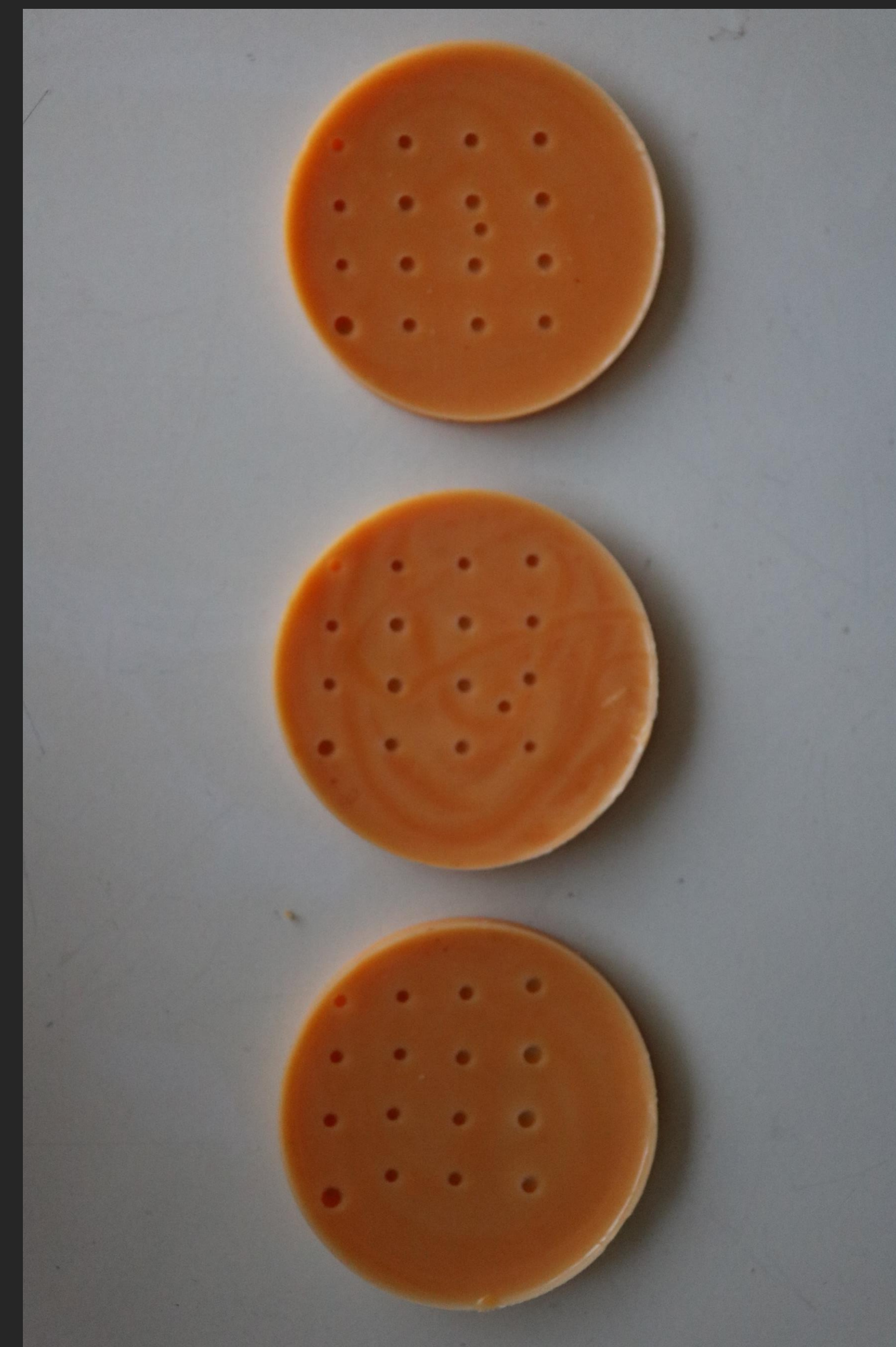
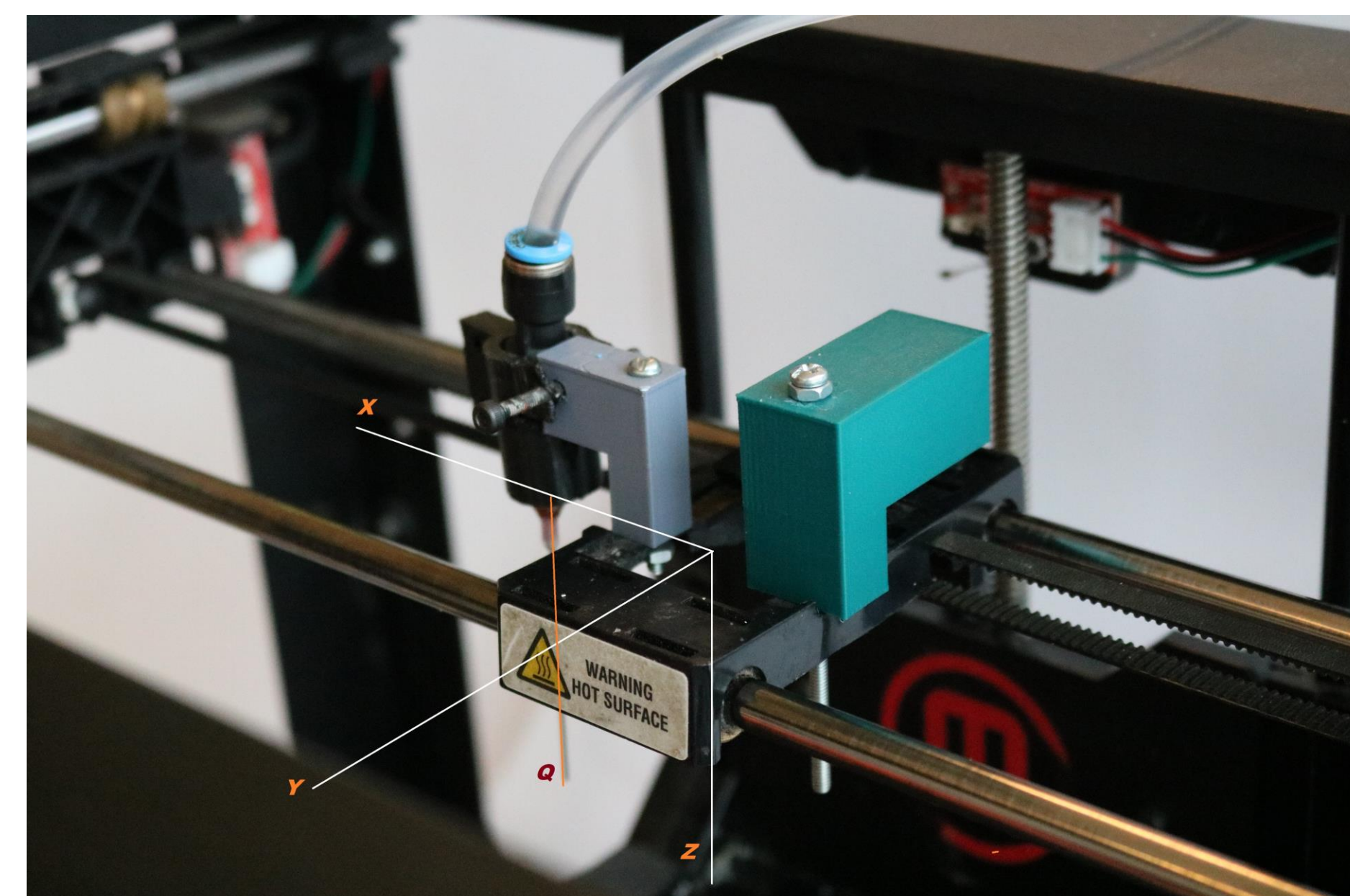
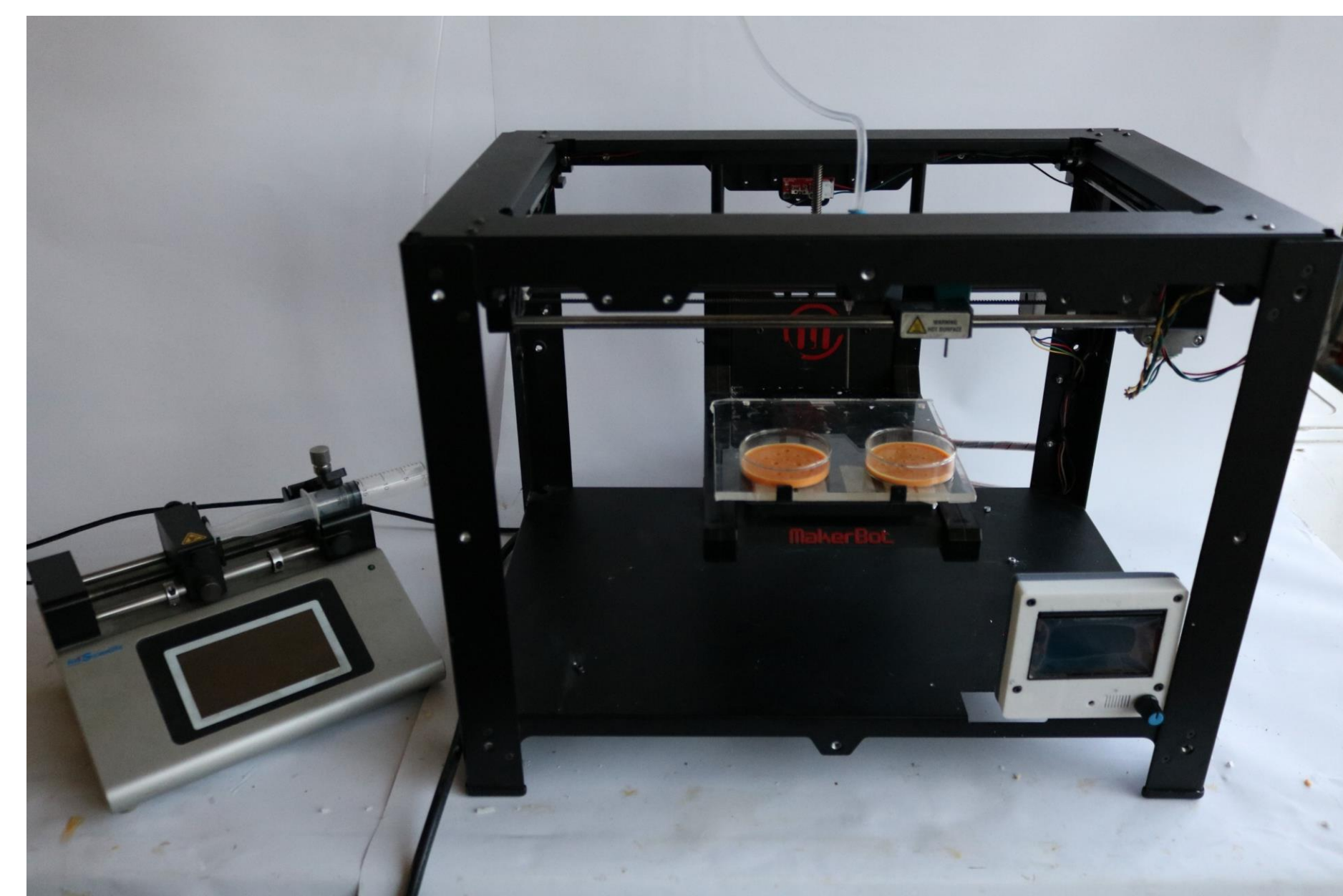
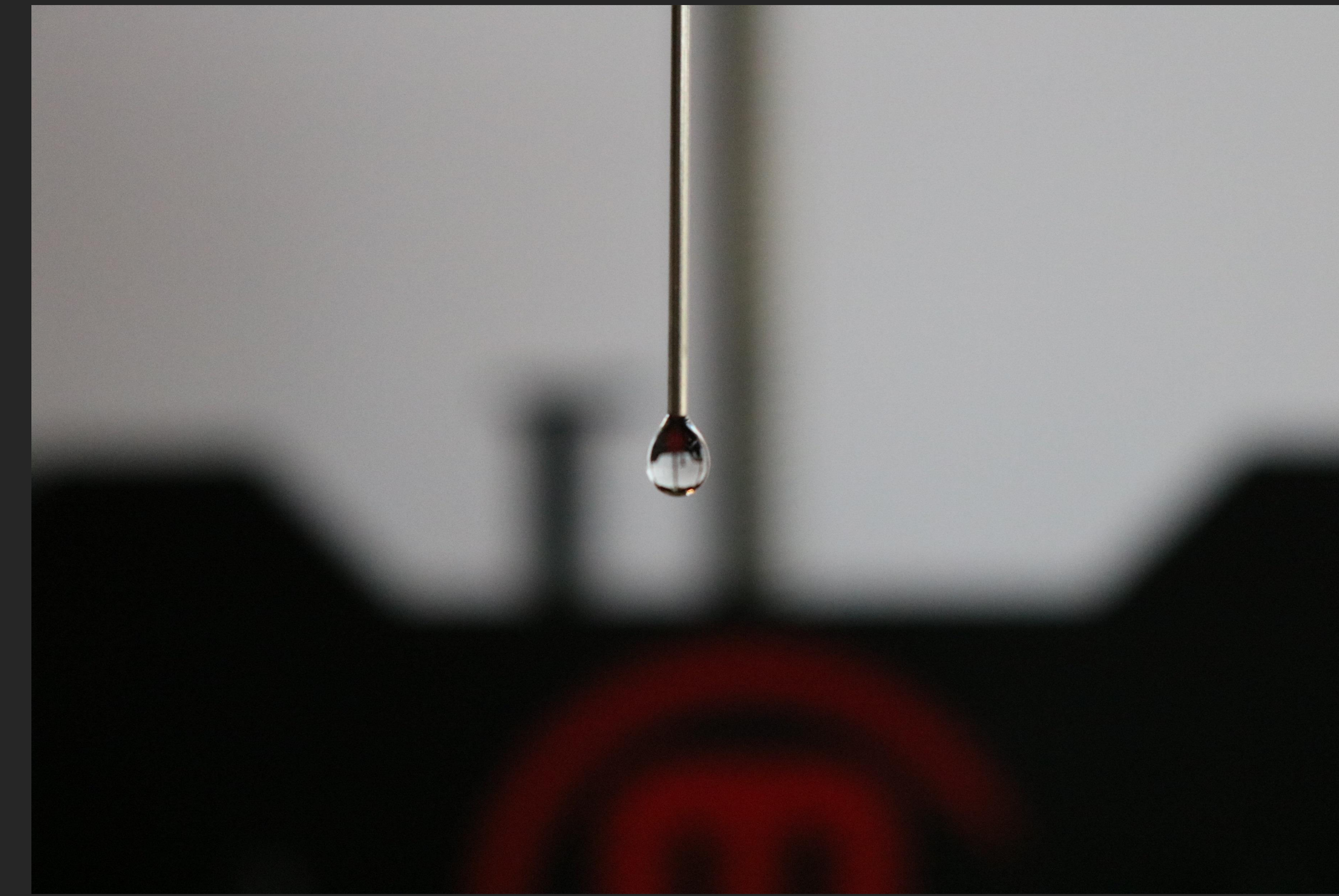
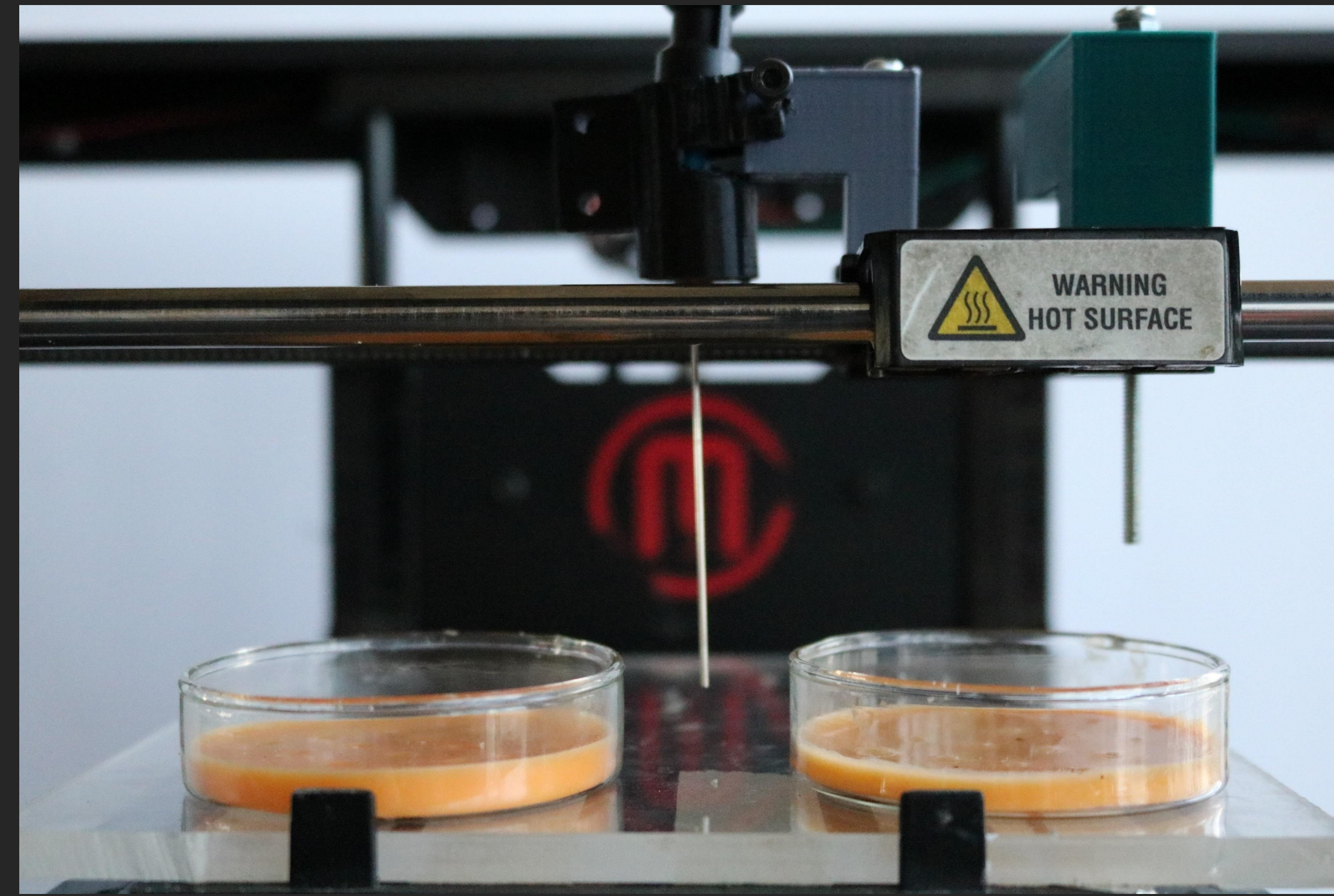
METHOD

To create these materials, we use a MakerBot 3D printer modified to work with a water pump, VPS (vinylpolysiloxane)

The printer moves in a (X,Y,Z) plane. Meanwhile we manually use the water pump to apply a flux Q that travels to the needle and let us do the dripping drops technique. The needle is parallel to the Z axis and very close to the VPS surface to ignore any falling effects that could alter the periodicity of the modified elastomer.

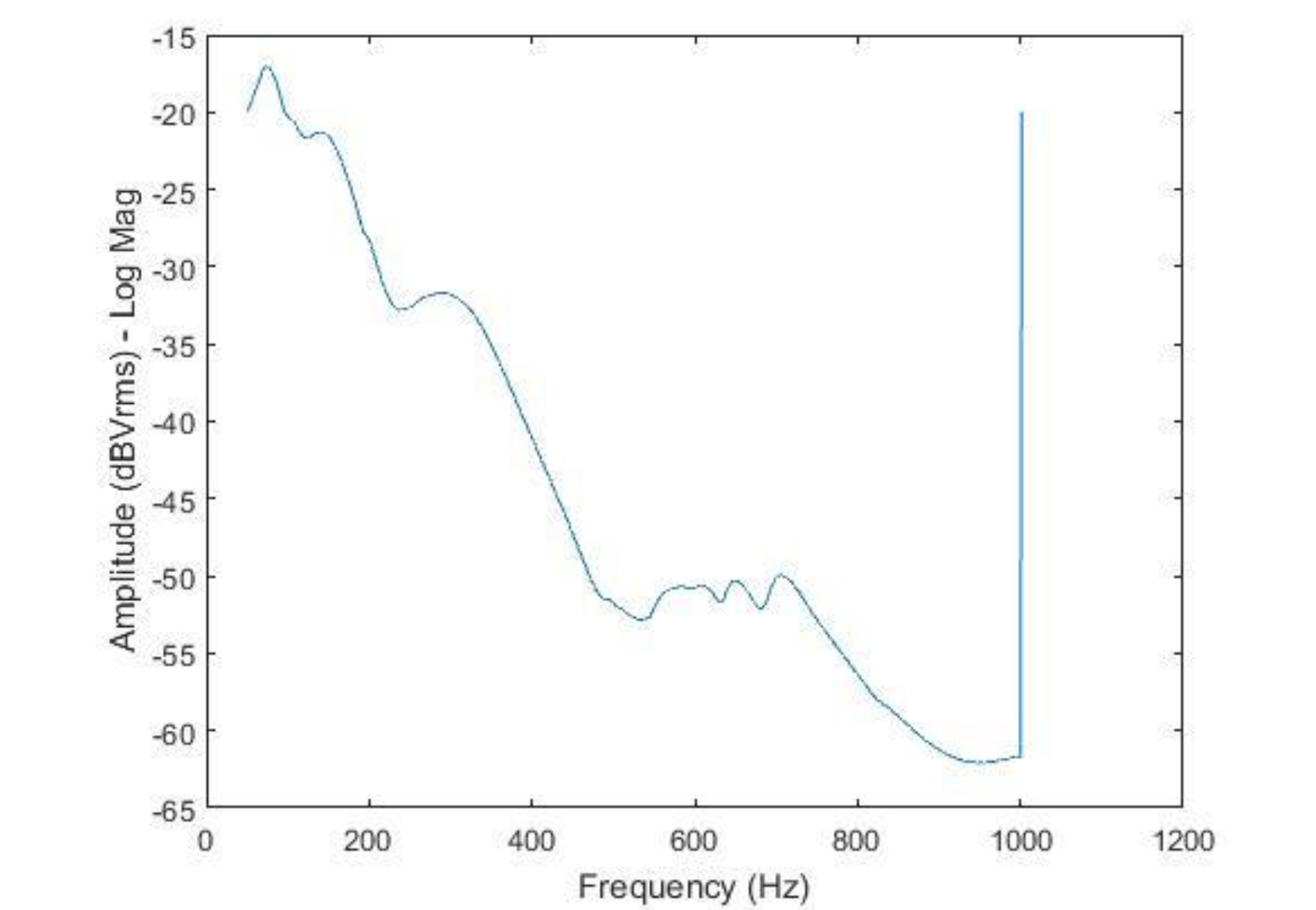
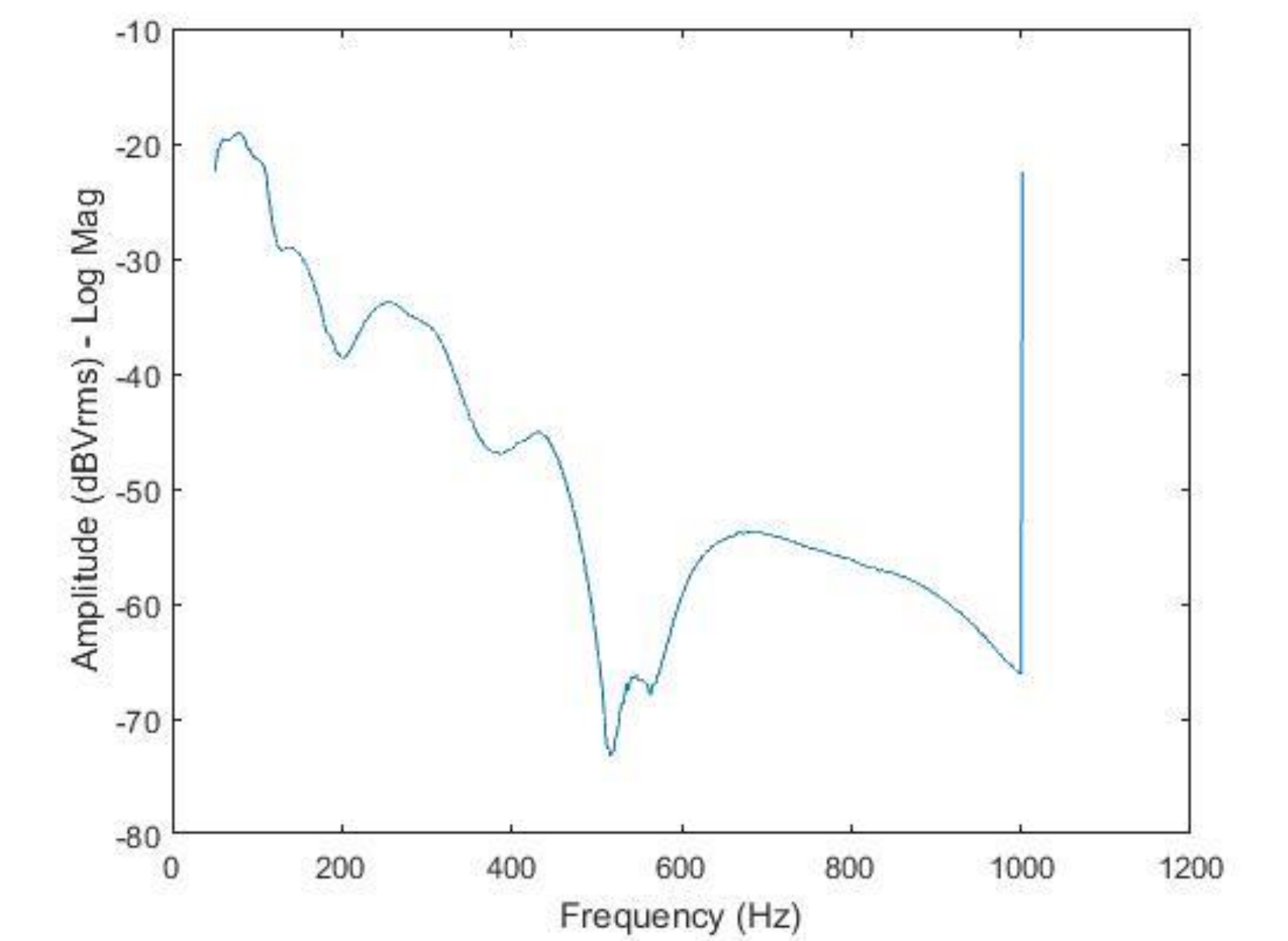
To quicken the process, we used four cylinder shaped glasses (at first we were using just one rectangular recipient) because it takes about 10 minutes to the VPS to get to a solid state.

Metamaterials can be created quicker by dripping drops.



RESULTS

- It was possible to place drops in a periodical pattern using the 3D printer, so the wave scattering can go out of the elastomer at first. (Doesn't work with random patterns).
- Using an iterative process with nearly 2D printed solids, we could achieve a 3D model that worked out well with the wave scattering.



References:

- 1) Pierre-Gilles de Gennes, Françoise Brochard-Wyart, David Quéré (2004). Capillarity and Wetting Phenomena: Drops, Bubbles, Pearls, Waves.

Acknowledgements:



And special thanks to:

