

# Development of a Portable Optical Sensor for the Evaluation of MIP Dye-Displacement Assays in the context of Food Screening

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## Introduction

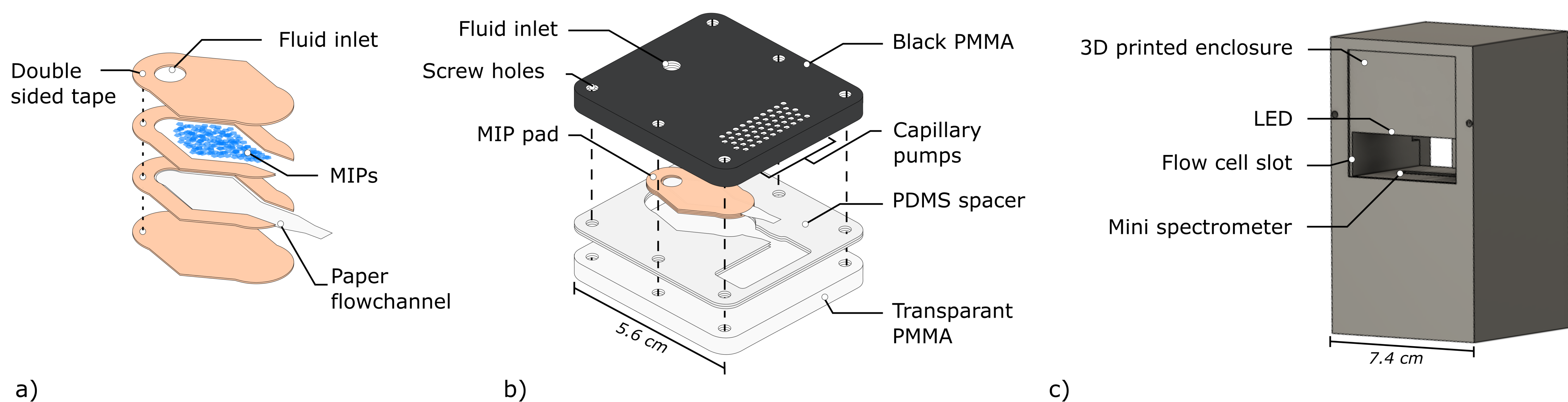
### MIP dye-displacement assay:

- Competitive Molecularly Imprinted Polymers (MIPs)
- Loaded with dye: Malachite Green
- Extremely specific to target: 2-MXP
- Release of dye when in contact to target molecule

### Aim:

- Produce a filter and a flow cell to carry out MIP dye-displacement assay
- Develop a portable, easy-to-use, and fast sensing device to read out the color intensity of the sample

## Sensor Setup



### MIP Dye-Displacement Filter:

- Trapped MIP particles
- Paper flow channel
- Double sided tapes

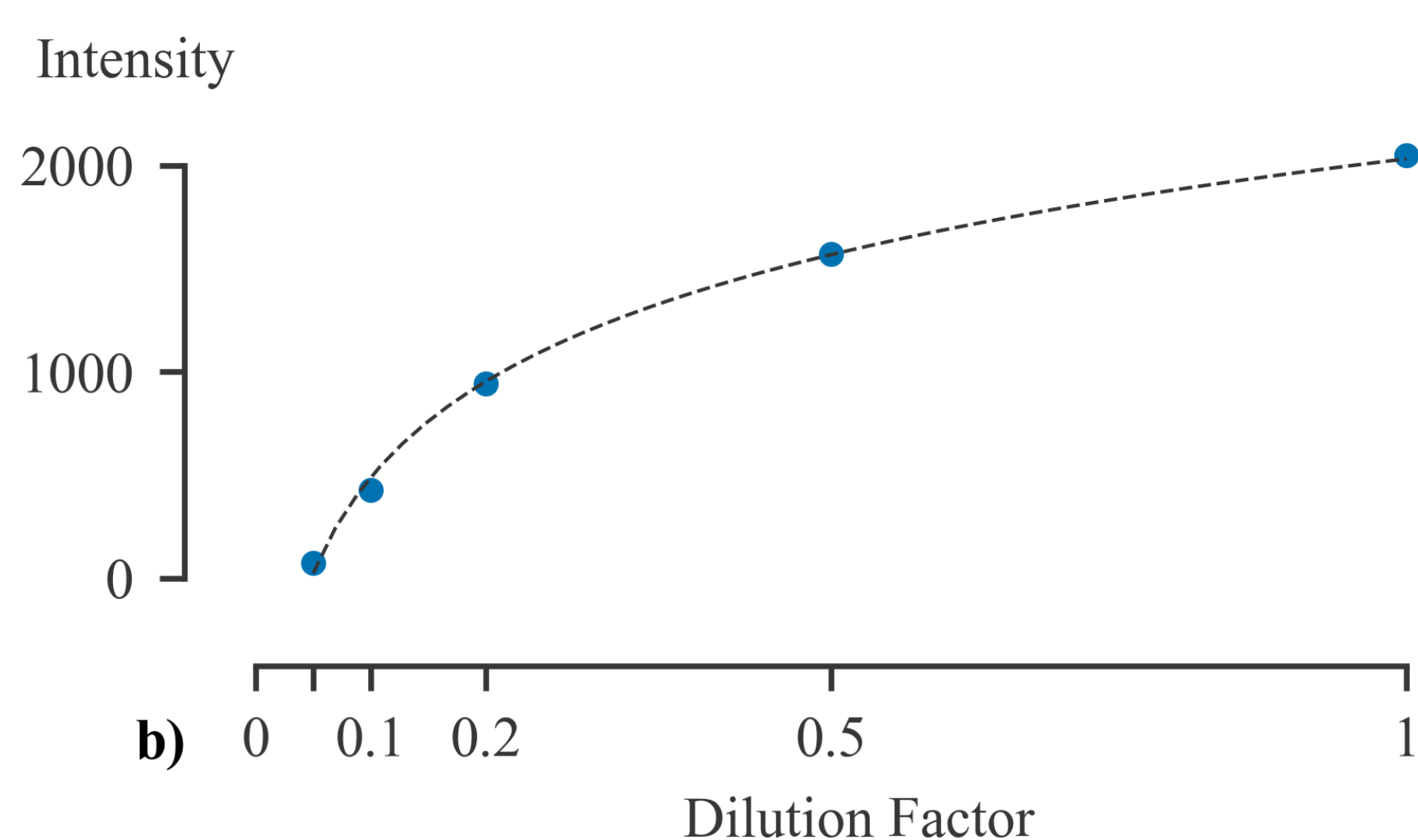
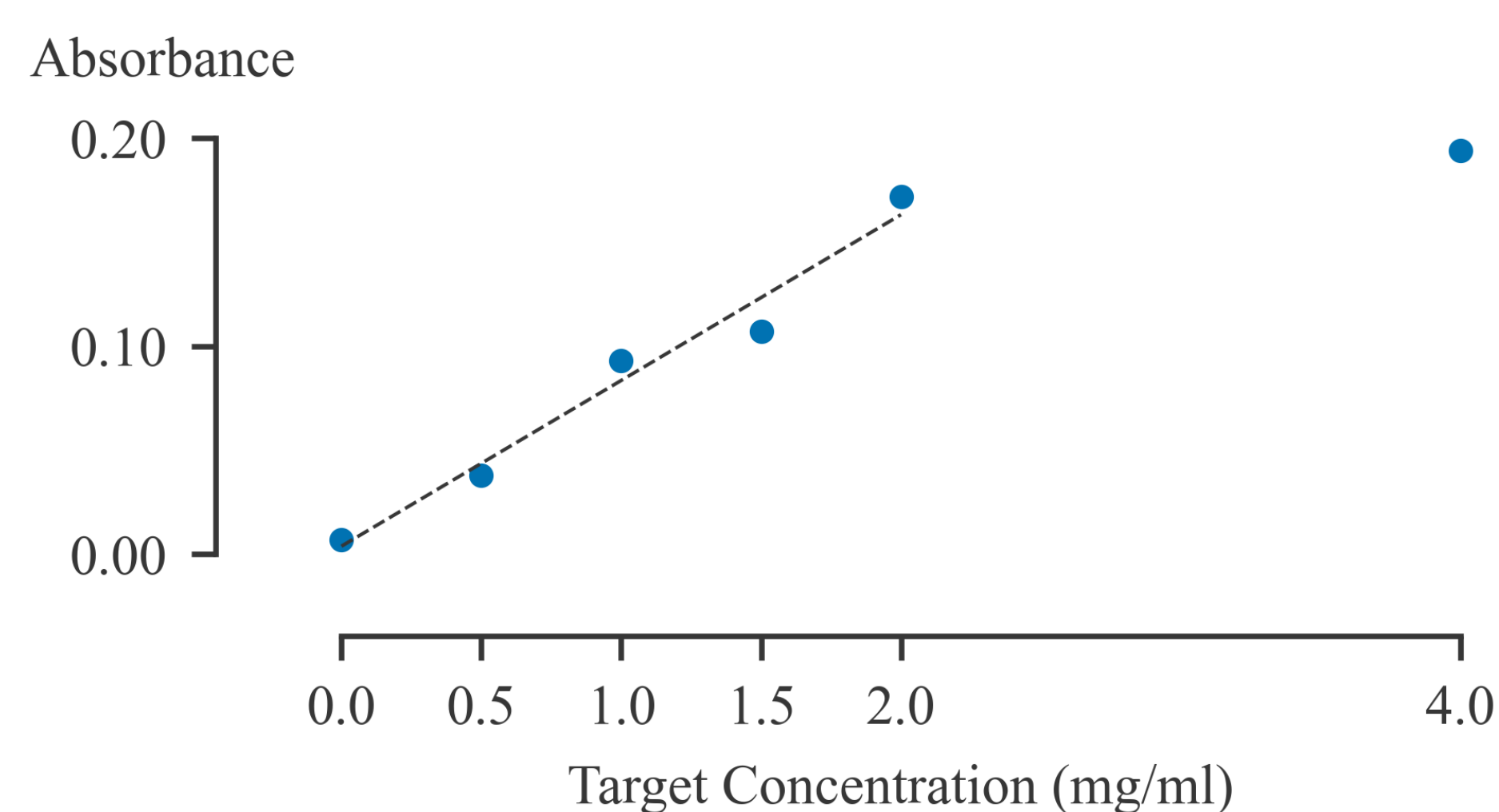
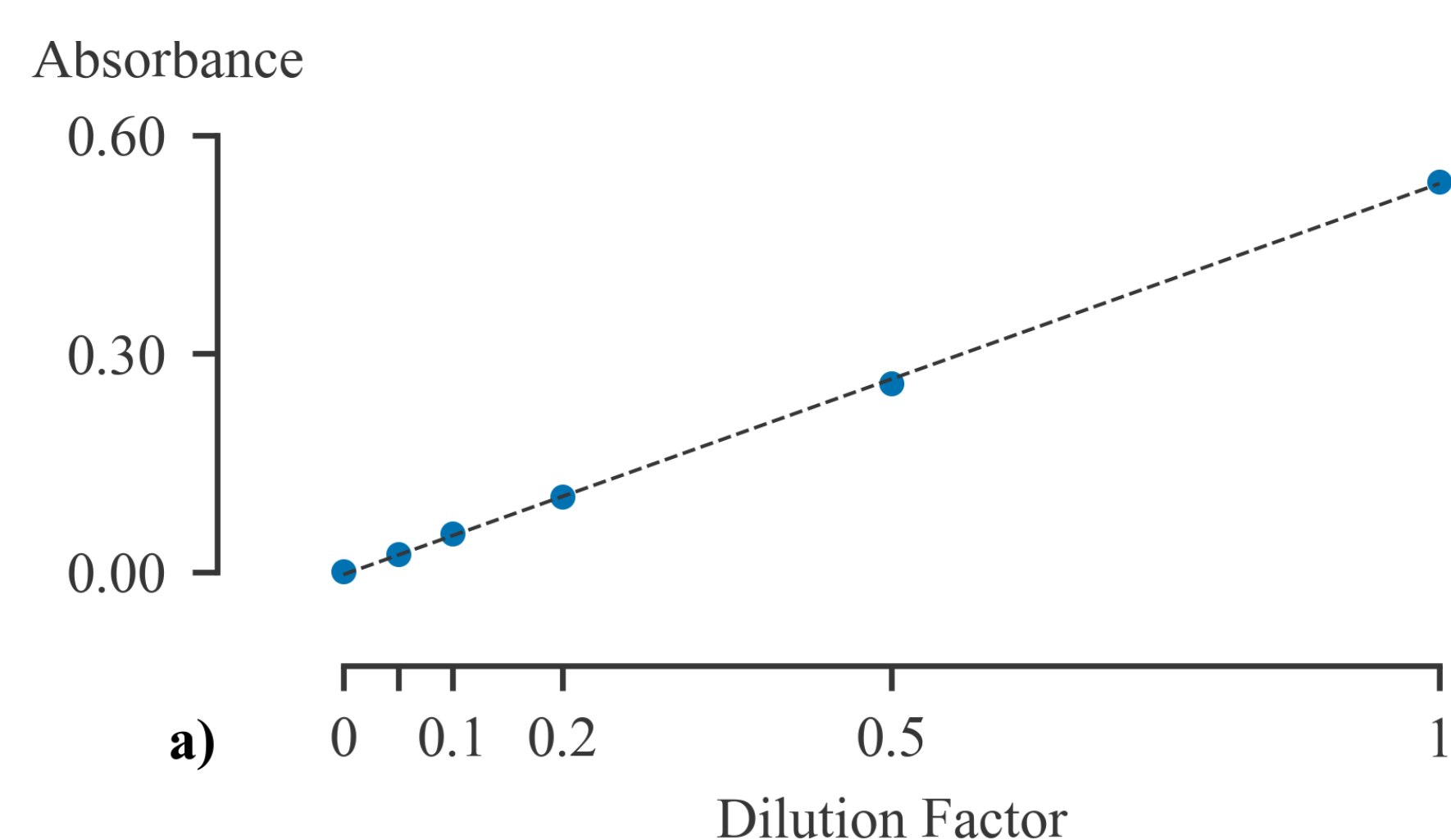
### Flow cell:

- Holds dye-displacement filter
- Passive fluid flow by capillary pumps
- Optical sensor samples trough liquid column of capillaries

### Spectrometer setup:

- 3D printed enclosure
- Built-in mini spectrometer (Hamamatsu C12880)
- Built-in LED (broad spectrum white)
- Slot fits cartridge for standard cuvettes or flow cell

## Results



### Absorbance after dye-displacement:

- Measured the absorbance (620nm) of the sample after dye-displacement using the flow cell
- Nanodrop 2000c in droplet-mode
- Saturation at 2mg/ml of target

### Measurement of color intensity:

- Dilution of arbitrary malachite green solution (620nm)
- Absorbance measured using Nanodrop 2000c → linear trend
- Intensity measured using in-house optical sensor → logarithmic trend
- Using standard cuvettes

## Conclusion and future work

- In-house sensor is able to assess the color intensity using a logarithmic trend
- The MIP-filter in combination with the passive flow cell can be used to easily perform dye-displacement assays
- Currently, the MIP filter saturates at 2mg/ml of target
- Next, dye-displacement assay will be performed in the flow cell and directly measured in the in-house sensor whereafter the LOD can be determined

## Acknowledgements

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