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DETERMINATION OF DRUG ABSORPTION ON 3D-PRINTED MICROFLUIDIC DEVICES

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Characterization of 3D-printed microfluidic devices

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1
Determination of drug absorption

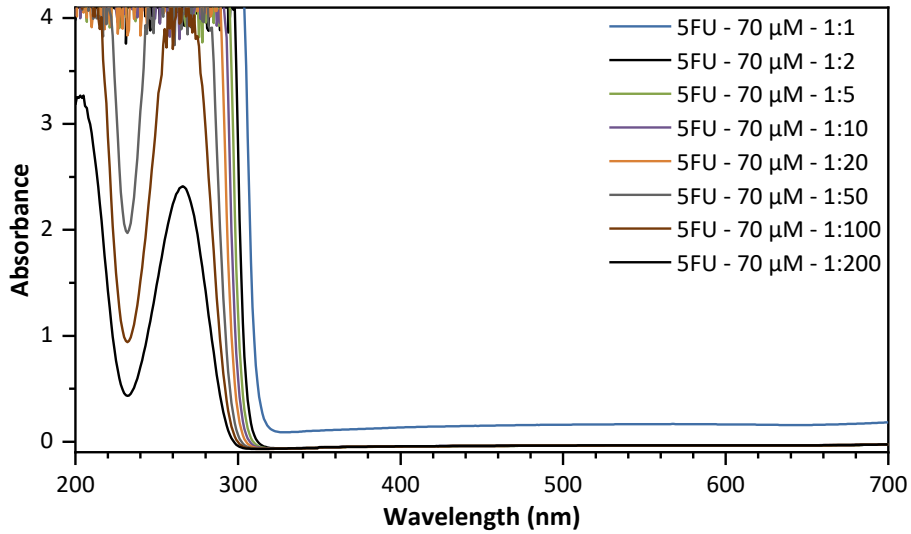
1.1 Protocol for sample preparation

The protocol for the determination of the drug absorption on the 3D-printed microfluidic devices was provided by CanChip GmbH as follows:
5-Fluorouracil (5FU) solution in distilled water was prepared at a concentration of 70 µM. A volume of 200 µL of drug solution was pipetted into 3 3D printed chips and incubated at 37°C for 24, 48, or 72 hours. At the end of each time interval, the drug solution was pipetted out of the chips and transferred into the 200 µL-microtubes. As a control, stock drug solution (70 µM) in 200 µL-microtubes was incubated with chips at 37°C for 24, 48, or 72 hours. The whole sample preparation was done by CanChip GmbH.
The drug solution samples removed from the chips were obtained in Fraunhofer IAP to determine the absorption at the wavelength of 265-266 nm by a UV-Vis-NIR spectrophotometer (Cary 5000, Varian).

1.2 Determination of optimum dilution factor for drug solution samples

A stock drug solution (70 µM) was diluted serially and their UV-Vis spectra were recorded in the range of 200-800 nm (Figure 1)to determine the optimum dilution factor for the drug solution samples. A dilution factor of 1:200 (0.35 µM or 350 nM) was selected as the optimum dilution factor, which led to the absorption of 2.41 at the wavelength of 266 nm.

Figure 1. UV-Vis spectrum for drug solution (70 µM) at different dilutions.



1.3 Determination of absorption at 266 nm

The UV-Vis spectra of the drug solution samples pipetted out of chips after 24, 48, or 72 hours were recorded (Figures 2-4). The UV-Vis spectra of the control (stock drug solution

with a concentration of 70 µM in 200 µL-microtubes) were recorded at the same time. The whole solution samples were diluted with a factor of 1:200.

Figure 2. UV-Vis spectrum for drug solution pipetted out of chips after 24 hours. Control was a stock drug solution in 200 µL-microtubes.

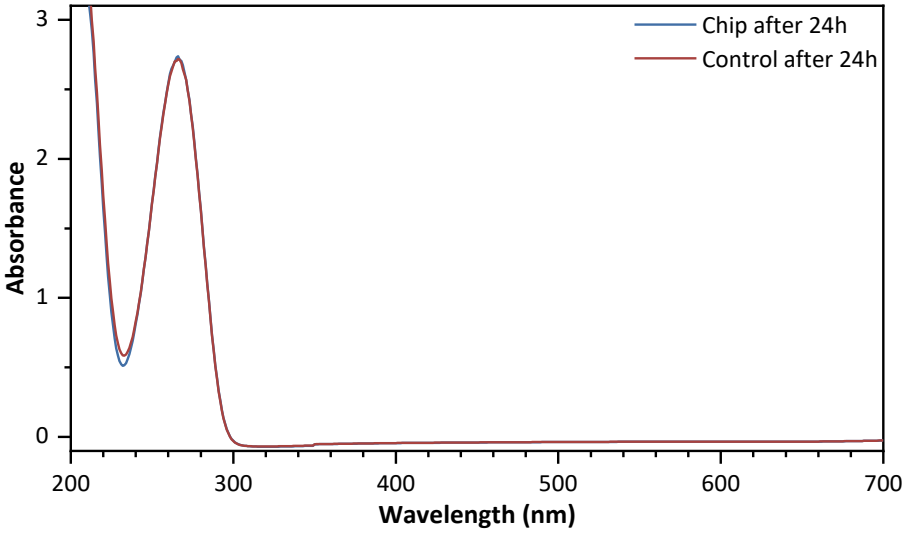
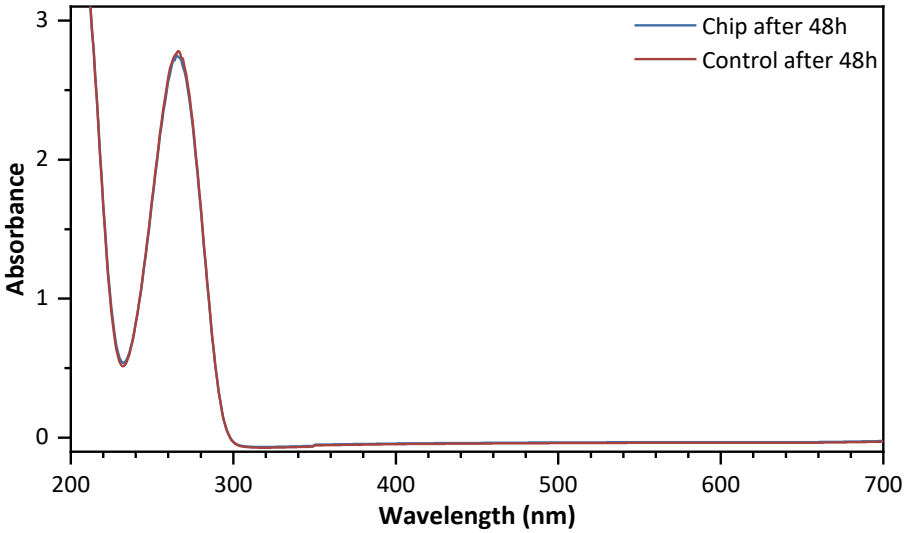


Figure 3. UV-Vis spectrum for drug solution pipetted out of chips after 48 hours. Control was a stock drug solution in 200 µL-microtubes.



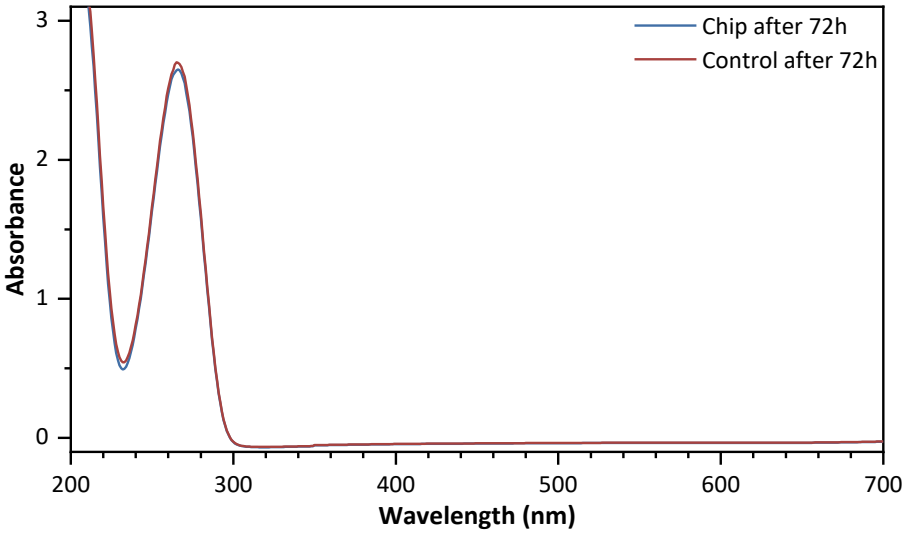


Figure 4. UV-Vis spectrum for drug solution pipetted out of chips after 72 hours. Control was a stock drug solution in 200 µL-microtubes.

The absorption values for drug solution samples and controls at 266 nm are collected in Table 1. The drug absorption present for chips was simply calculated by the following equation:

$$Drug\ absorption\ (\%) = \frac{Absorption\ of\ drug\ solution\ sample\ at\ 266\ nm}{Absorption\ of\ control\ at\ 266\ nm} \times 100$$

Table 1. Absorption for drug solution sample and control at 266 nm after 24 hours.

Sample	Absorption of drug solution sample at 266 nm	Absorption of control at 266 nm	Drug absorption (%)
24 h	2.737	2.718	0.0