1. Overview
• Increasingly, we are witnessing a growing interest in real time in-situ monitoring of chemical or biological species, particularly for situations that demand rapid access to time-critical data.
• 3D printing was used to rapidly develop a mobile Centrifugal Microfluidic Analysis System (CMAS, shown in Fig. 1) for in situ colorimetric analysis.

2. CMAS hardware fabrication
• A 3D-printed housing, shown in Fig. 2, was produced for hosting the microfluidic discs. A low-cost LED-photodiode optical sensor was used for colorimetric detection and a stepper motor generated the centrifugal force necessary to carry out the tests.

3. Design of microfluidic disc
• Each disc was designed with six test areas consisting of a sample chamber and either single/dual reagent chambers connected to a common reaction/detection chamber as shown in Fig. 3.

4. Analysis of nutrients on microfluidic discs
• Standards of nitrite, ammonia and orthophosphate were aliquoted on individual discs and calibration curves were plotted (see Fig. 4).
• Microfluidic discs were spun for delivering sample and reagent to the detection chamber. Different time intervals were required for full color development as summarised in Table 1.

5. Future work
• Further research is in progress to develop a single disc capable of performing automatic simultaneous detection of these analytes from a single sample aliquot.

6. References

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