Supplementary Information

Measurement of Serum Phosphate Levels Using a Mobile Sensor

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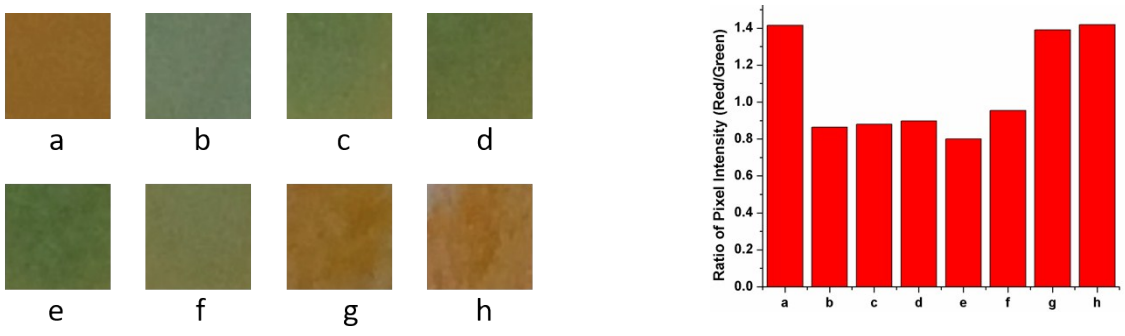
Different paper materials were tested by first spotting the malachite green (Cayman Chemicals) on them and observing the changes in color (Figure S1A). Quantitative analysis was performed by splitting the color images into RGB channels and then taking the ratio of the red pixel intensities with respect to the green pixel intensities as shown in Figure S1B. We observe that Fusion 5 and Grade standard 14 fiberglass materials showed minimal or no interference with the assay. The serum separation device prototypes were then developed using these materials as collection pads and their response was tested using the well cartridge containing the malachite green assay (DIPI-500), as shown in Figure S2. We observe an increased signal for Fusion 5, compared to the control (no collection pad), indicating slight interference from Fusion 5, whereas the fiberglass material did not show interference and was chosen for the final prototype.



(A) (B)

Figure S1: (A) Photographs of malachite green spots on different paper materials (80x80 pixels). The different papers tested are: (a) Control, (b) BA-83, (c) HF-18002, (d) HF-18004, (e) HFC-180UB, (f) FF80HP, (g) Fusion 5, (h) Grade standard 14. (B) Ratio of the average pixel intensities (red/green) corresponding to each spot shown in (A).

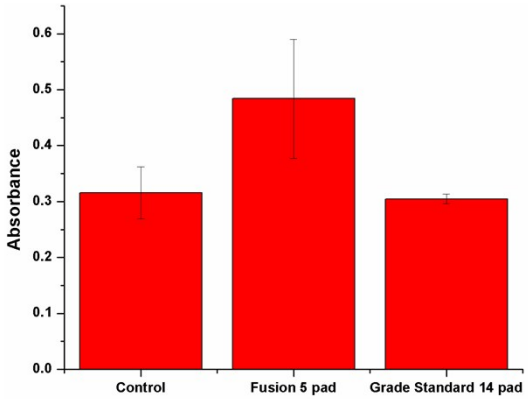


Figure S2: Interaction between the two selected paper materials (Fusion 5 and Grade Standard 14) with the malachite green assay, quantified using a well plate reader.

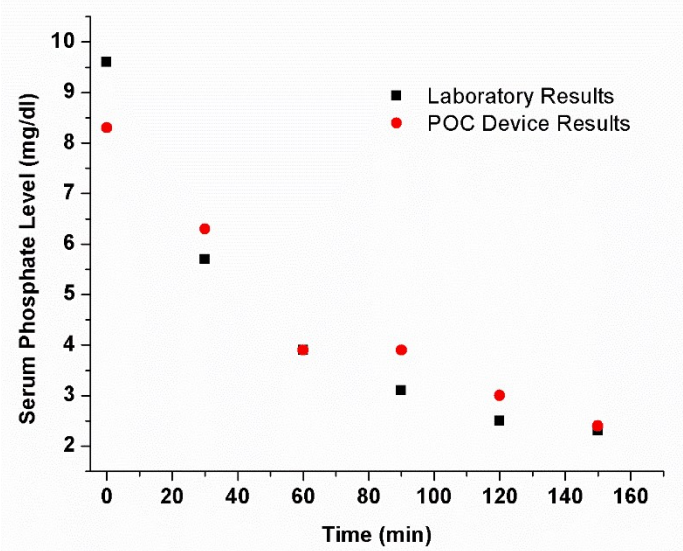


Figure S3: The temporal changes in the serum phosphate level from an individual patient undergoing a dialysis session, measured using our smartphone device, compared against the laboratory results, measured using an Alfa-Wasserman ACE® Alera Systems analyzer.

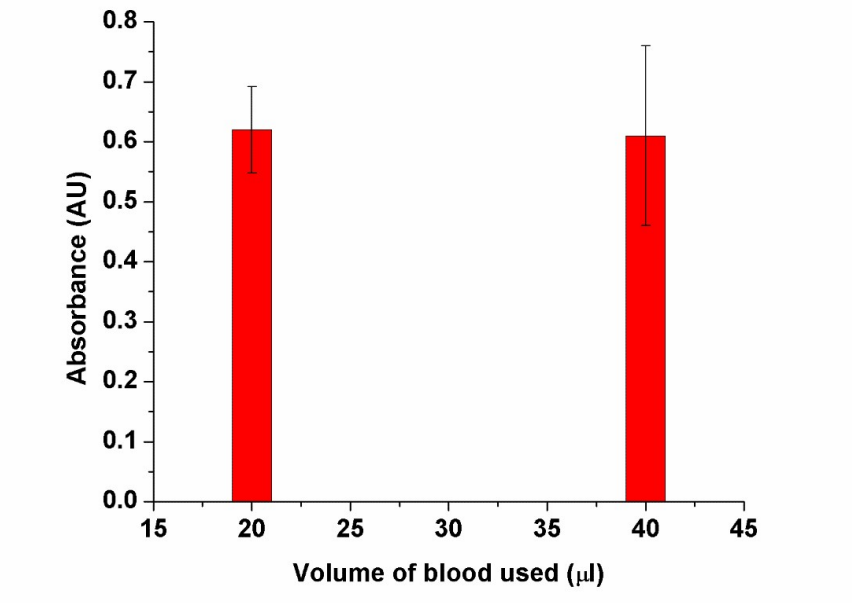


Figure S4: The absorption of the Malachite Green reagent after reacting with serum collected using the chip. The absorbance was measured using a plate reader. Two different volumes of blood were used (20 µl and 40 µl). We do not observe any significant difference in the amount of serum collected from both quantities of blood (n=4).

	P1	P2	P2	P1	P2	P1	P2	P1	P2	P3	P2
Laboratory Results (mg/dL)	2.2	2.3	2.5	2.6	3.1	3.4	3.9	4.7	5.7	5.8*	9.6
POC Device Results (mg/dL)	2.3	2.4	3	2.6	3.9	3.5	3.9	3.5	6.3	4.7	8.3
Coeff. of Variation	0.30	0.04	0.10	0.27	0.03	0.14	0.05	0.20	0.05	-	0.04

Table S1: Clinical testing results from patient samples. *: only one sample. The top row denotes the patient number.