

Supplemental Information

Alginate/Xanthan gum hydrogels as forensic blood substitutes for bloodstain formation and analysis.

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Table S1. The composition of each FBS candidate material assessed in this work. Components include alginate, CaCl₂ (Ca), xanthan gum (XG), electrospayed microparticles (MPs), ferric citrate (FeCit), magnesium silicate (talc) and Tween 20 (Tween 20).

Sample	Alginate (w/v%)	Ca ²⁺ (mM)	XG (w/v%) ×10 ⁻³	MPs (v/v%)	FeCit (w/v%) ×10 ⁻³	Talc (w/v%)	Tween 20 (v/v%)
AX5C1	1%	1	5.0				
AX5C1-10%	1%	1	5.0	10			
AX5C1.5	1%	1.5	5.0				
AX5C1.5-5%	1%	1.5	5.0	5			
AX5C1.5-10%	1%	1.5	5.0	10			
AX5C1.5-10% + Ta + Tw	1%	1.5	5.0	10		0.25	3.75 ×10 ⁻²
AX5C1.5-10% + Fe+ Tw	1%	1.5	5.0	10	5.0		2.5 ×10 ⁻³
X1_Ca-5%	1%	2	1.0	5			
X1_Ca-10%	1%	2	1.0	10			
X1_Ca-15%	1%	2	1.0	15			
X1_Ca-20%	1%	2	1.0	20			
AX5C2	1%	2	5.0				
X5_Ca-5%	1%	2	5.0	5			
AX5C2-5%	1%	2	5.0	5			
AX5C2-7.5%	1%	2	5.0	7.5			
AX5C2-8% + Ta + Tw	1%	2	5.0	8		0.25	2.5 ×10 ⁻²
AX5C2-8% + Fe + Tw	1%	2	5.0	8	5.0		2.5 ×10 ⁻²
AX5C2-8% + Fe + Ta + Tw	1%	2	5.0	8	5.0	0.25	2.5 ×10 ⁻²
AX5C2-9% + Fe + Ta + Tw	1%	2	5.0	9	5.0	0.25	2.5 ×10 ⁻²
AX5C2-9.5% + Fe + Ta + Tw	1%	2	5.0	9.5	5.0	0.25	2.5 ×10 ⁻²
AX5C2-9.5% + Fe + Ta + Tw	1%	2	5.0	9.5	7.5	0.25	2.5 ×10 ⁻²
AX5C2-9.5% + Fe + Ta + Tw	1%	2	5.0	9.5	10.0	0.25	2.5 ×10 ⁻²
X5_Ca-10%	1%	2	5.0	10			
AX5C2-10%	1%	2	5.0	10			
AX5C2-10% + Ta + Tw	1%	2	5.0	10		0.25	3.75 ×10 ⁻²
AX5C2-10% + Fe + Tw	1%	2	5.0	10	2.5		
AX5C2-10% + Fe + Tw	1%	2	5.0	10	5.0		2.5 ×10 ⁻³
X5_Ca-15%	1%	2	5.0	15			
X5_Ca-20%	1%	2	5.0	20			
X5_Ca	1%	2.5	5.0				

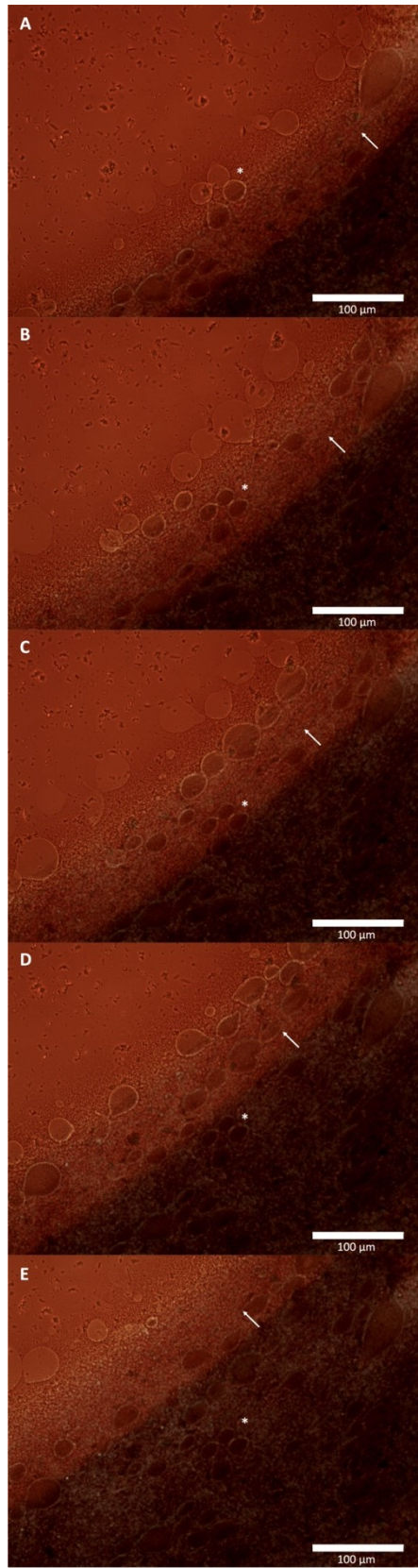


Figure S1. Time-lapse of FBS droplet drying. Images A-E represent ~30 s time intervals between images. * Denotes the same cluster of MPs and the arrow indicates drying front.

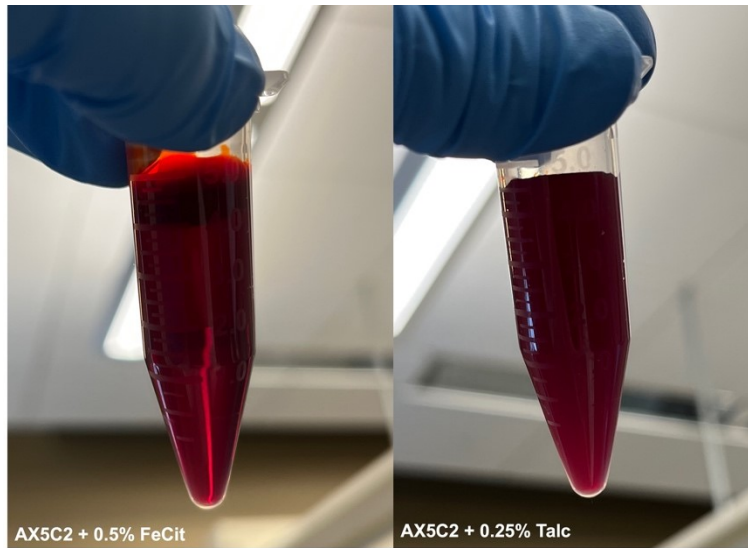


Figure S2. Appearance of FBS base material (1% w/v alginate, 5.0×10^{-2} w/v % XG, 2 mM CaCl_2 , "AX5C2") with ferric citrate (left) or talc (right).

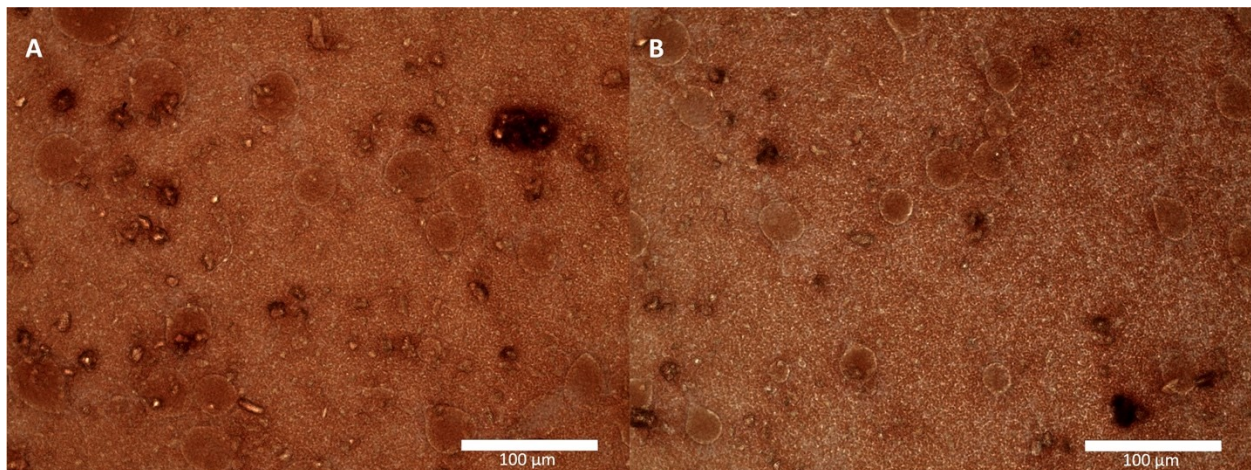


Figure S3. Microscope images of MPs within the FBS material before (A) and after (B) applied shear rates of $1\text{-}1200 \text{ s}^{-1}$.

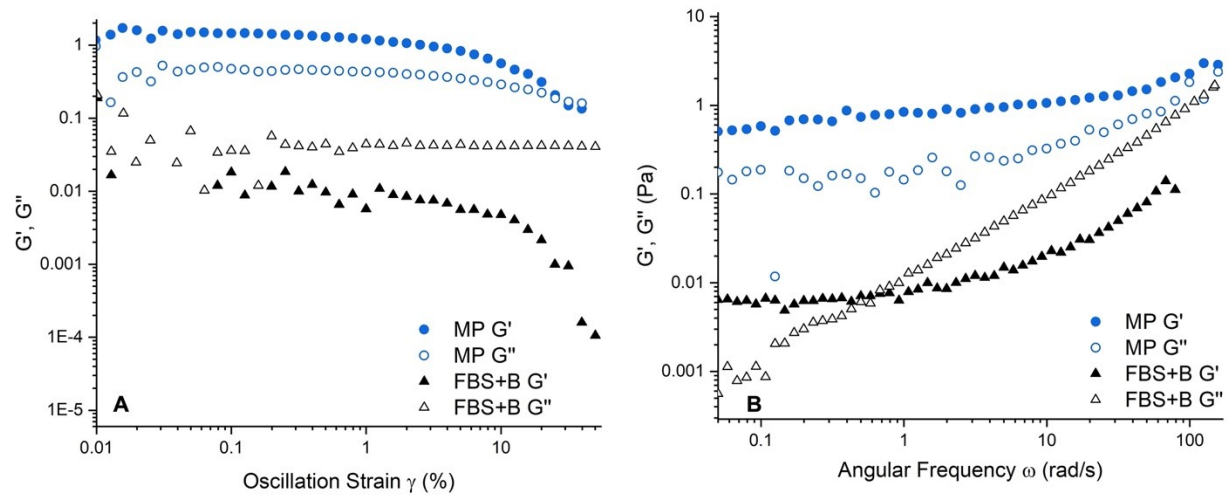


Figure S4. Amplitude sweep (A) and frequency sweep (B) of a concentrated MP solution (blue) and FBS + B (black). Filled-in symbols represent the storage modulus (G') and non-filled symbols represent the loss modulus (G'').

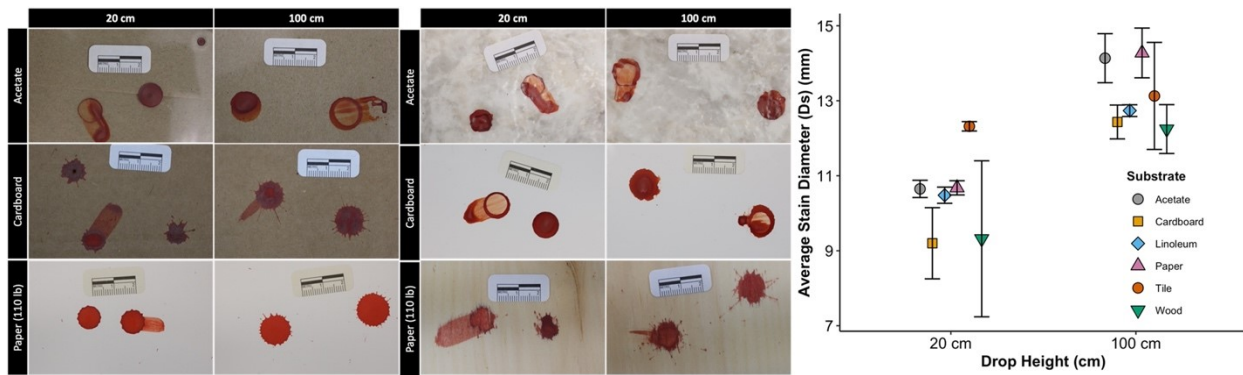


Figure S5. Drip stains dropped from 20 and 100 cm on six substrates: acetate paper, cardboard, paper, linoleum tile, tile, and wood (left). And the corresponding average stain diameter (D_s , $n=4$) (right).

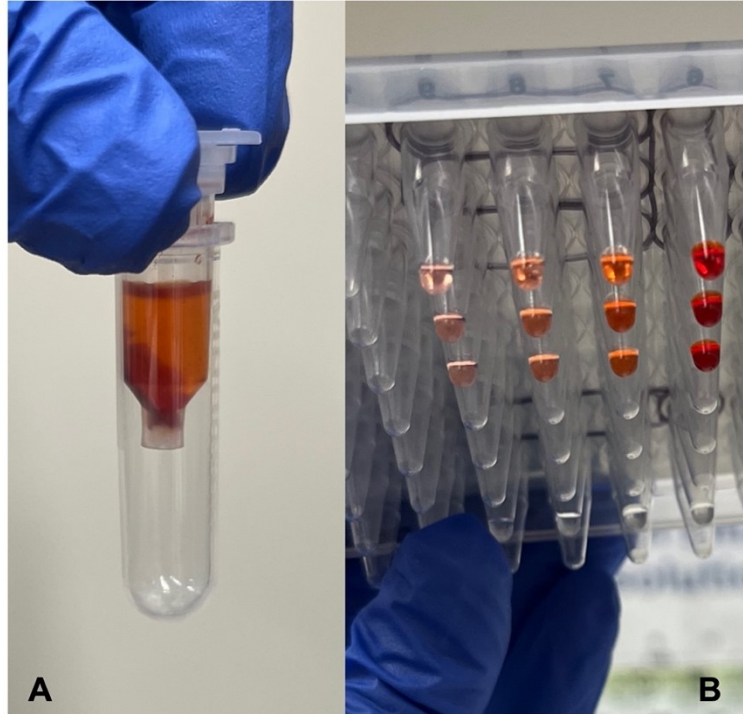


Figure S6. Image of filtration tube during extraction procedure where the red dye precipitates inside the filter (A) and the resulting PCR plate with various dilutions of extracted material from FBS (B). From left to right, the extracted DNA was added as 1:40 dilution, 1:20 dilution, 1:10 dilution, and stock.