- Supporting Information -

3D Printable Polyethyleneimine based Hydrogel Adsorbents for Heavy Metal Ions Removal

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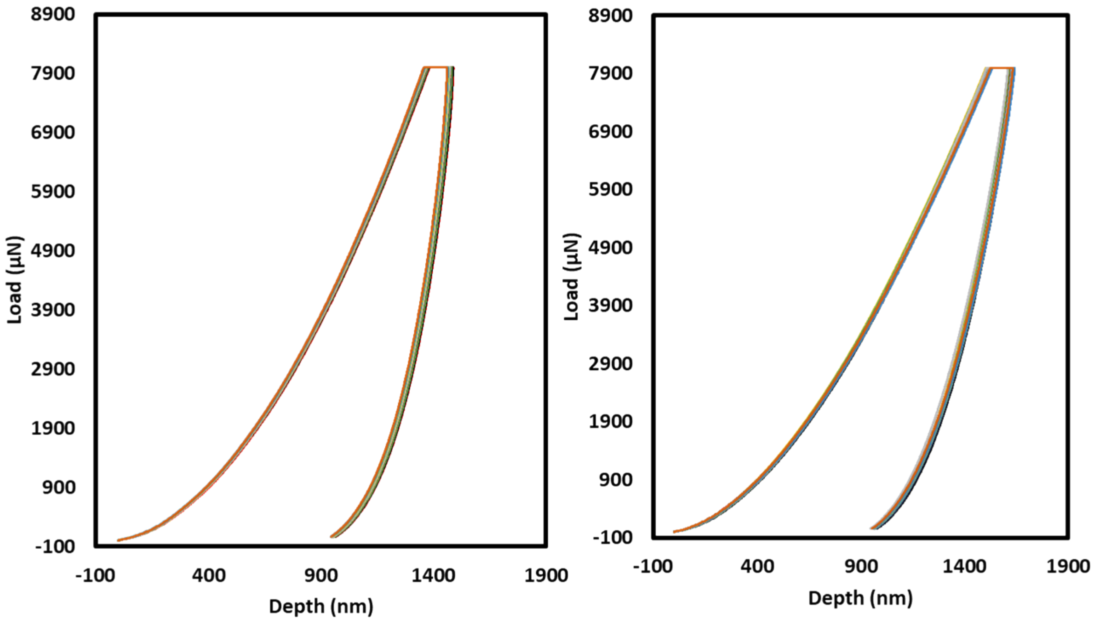

Fig. S1 Nanoindentation tests; load vs. depth profile of the dried films at higher loads.

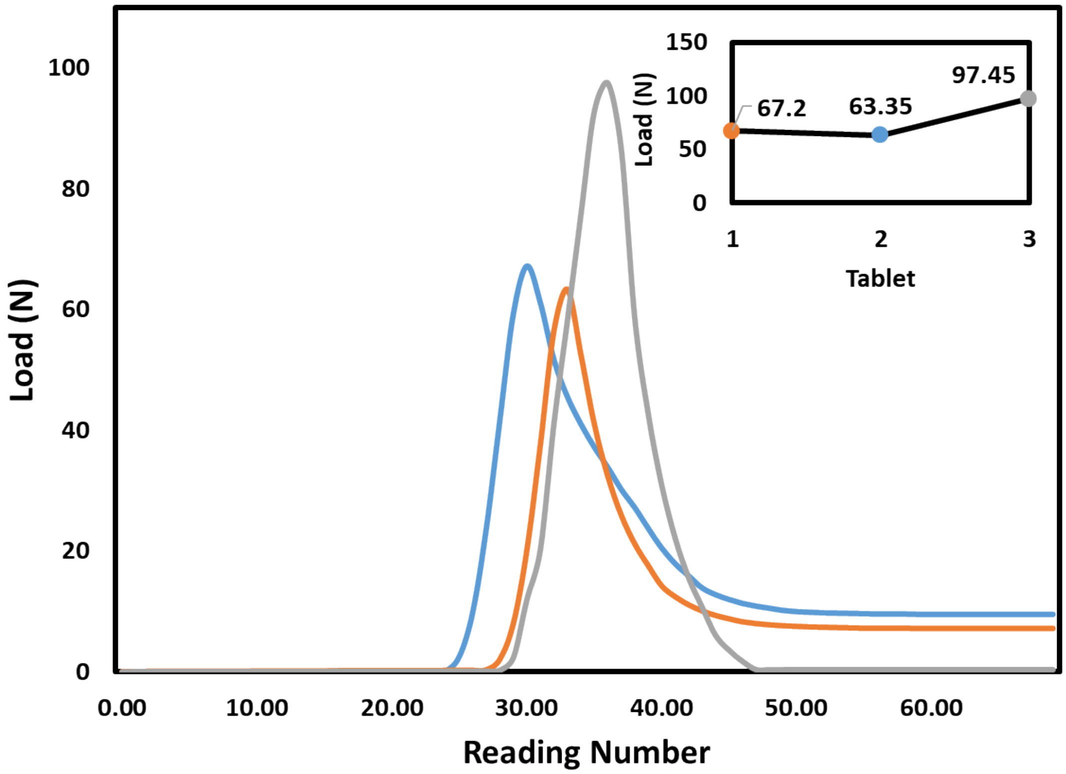

Fig. S2 Tensile profile of three dried tablets [10x10mm each]. Breaking point comparison of three dried tablets demonstrating their mechanical properties.

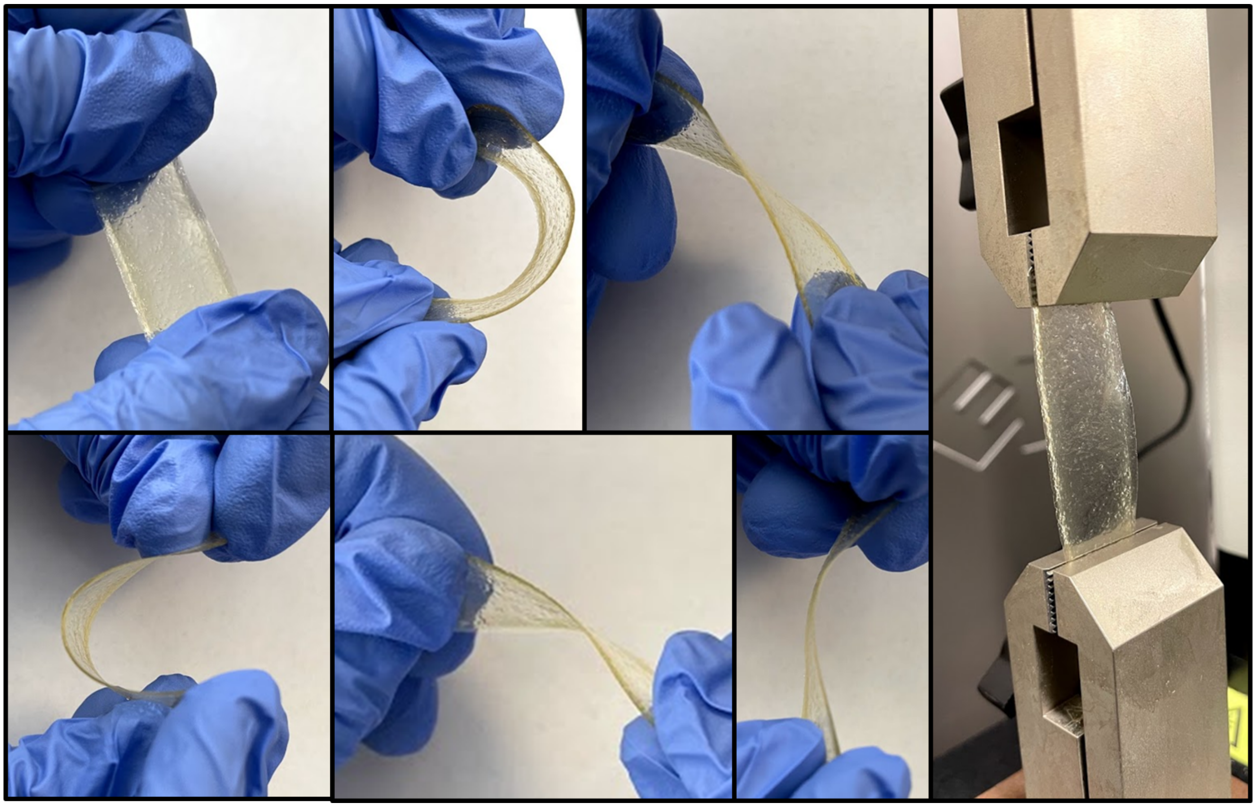

Fig. S3 To demonstrate the excellent mechanical properties of the 3D printable adsorbent, a thin film resembling a band with dimensions of 75x25x0.5mm was 3D printed and dried. The band was then exposed to mechanical forces to check its response to repeated bending and twisting. The band did not deform after being bent at a 90 angle on each side 50 times (100 times in total) and twisted on each side 50 times (100 times in total). Tensile testing of these bands was done before and after these bending tests. Even when a uniaxial force over 100 N (instrumental limit) was applied along the length of the band, the band did not break or deform uniaxially.

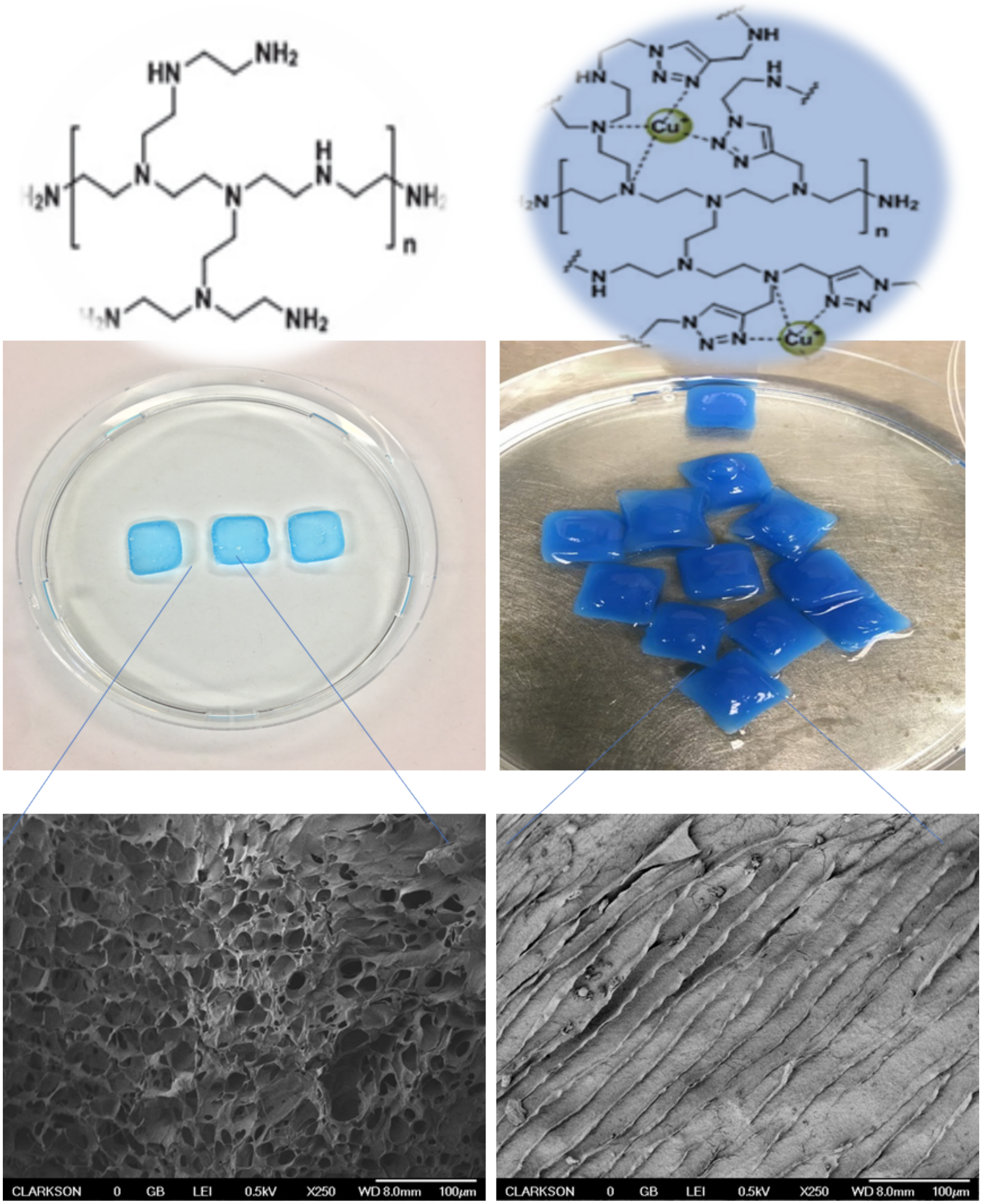

Fig. S4 Representation of the 3D printed tablets exposed to a solution of Cu2+ showing deformation of the tablets after removal and pore closure because of crosslinking and stabilization of Cu with the PEI.

Table S1: Comparison of the different hydrogels' viscosity at different temperatures at a shear rate of 1 s^{-1}

Type	Viscosity at 20°C (Pa.s)	Viscosity at 30°C (Pa.s)	Viscosity at 40°C (Pa.s)	Viscosity at 50°C (Pa.s)
Alginate (Al) 8%	717.80	571.66	488.37	394.74
Gelatin (Gel) 5%	327.88	180.84	0.07	0.01
Al-Gel composite	854.36	651.92	430.32	307.69
Al-Gel-PEI	1148.70	714.050	504.12	365.00

Table S2: Comparison of the different hydrogels' viscosity at different temperatures at a shear rate of 2 s^{-1}.

Type	Viscosity at 20°C (Pa.s)	Viscosity at 30°C (Pa.s)	Viscosity at 40°C (Pa.s)	Viscosity at 50°C (Pa.s)
Alginate (Al) 8%	430.30	360.54	307.29	254.73
Gelatin (Gel) 5%	159.02	70.71	0.03	0.00
Al-Gel composite	482.42	383.80	268.12	224.06
Al-Gel-PEI	499.45	373.59	287.36	227.87