Article:

Lyu, Y., Li, A. orcid.org/0000-0001-8897-0447, Wu, J. et al. (4 more authors) (2025) Enhanced mechanical performance of 3D printed continuous carbon fibre reinforced polyphenylene sulphide composites through dopamine treatment and post-processing compression. Composites Part A: Applied Science and Manufacturing, 190. 108627. ISSN 1359-835X

https://doi.org/10.1016/j.compositesa.2024.108627

SUPPLEMENTARY INFORMATION

Enhanced mechanical performance of 3D printed continuous carbon fibre reinforced polyphenylene sulphide composites through dopamine treatment and post-processing compression

Yahui Lyu[1], Aonan Li[1], Jiang Wu[1], Vasileios Koutsos[1], Chun Wang[2], Conchúr M. Ó Brádaigh[3], Dongmin Yang[1,*]

[1] School of Engineering, Institute for Materials and Processes, University of Edinburgh, EH9 3FB, Edinburgh, UK

[2] Institute of Functional Surfaces, School of Mechanical Engineering, University of Leeds, LS2 9JT, Leeds, UK

[3] Department of Mechanical Engineering, University of Sheffield, S10 2TN, Sheffield, UK

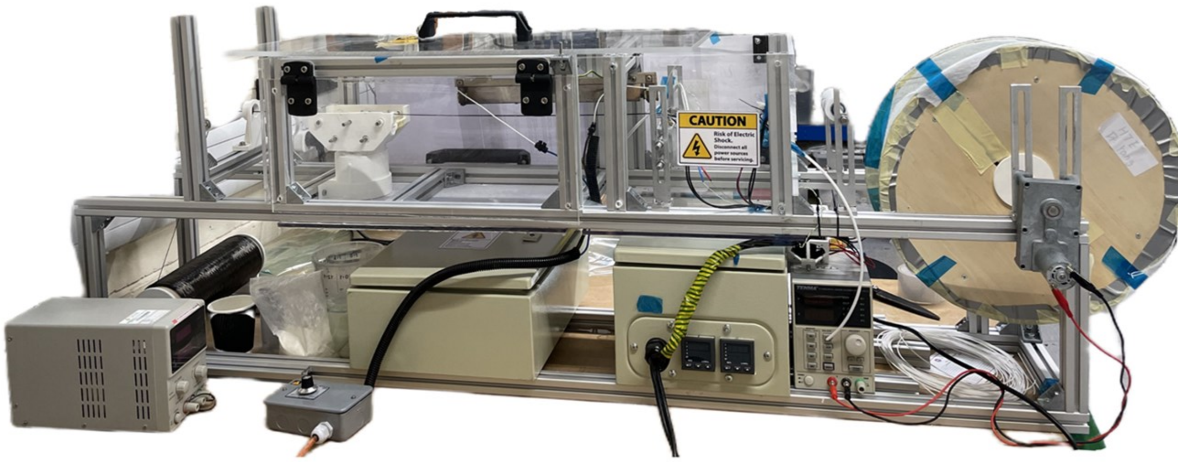


Figure S1. Set-up of an in-house developed filament-line.

* Corresponding author. Email: Dongmin.Yang@ed.ac.uk

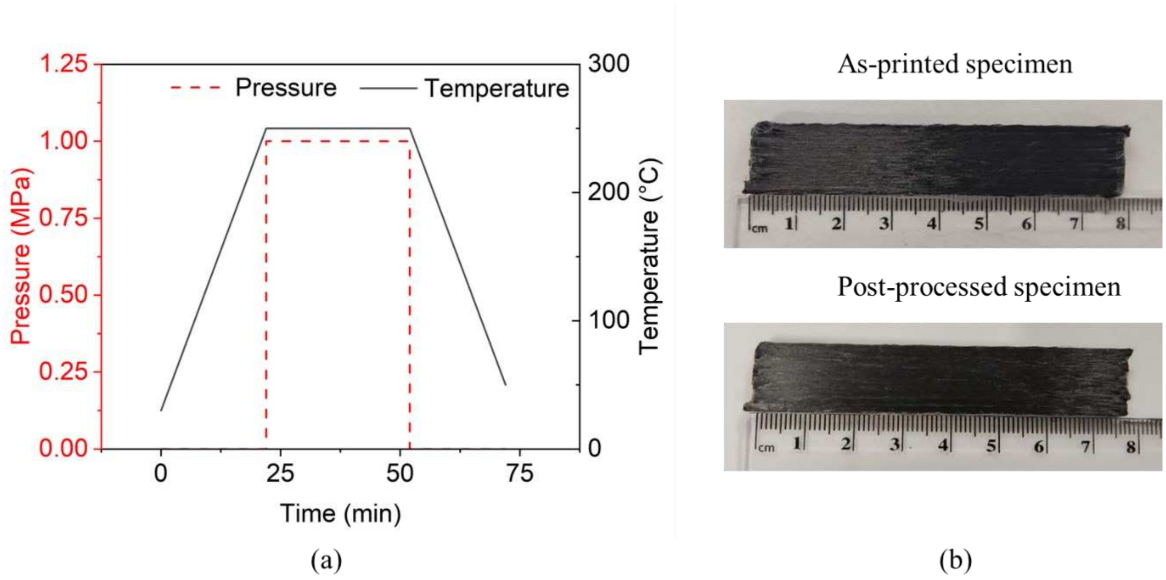


Figure S2. (a) Hot-press program and (b) as-printed and post-processed printed specimens.

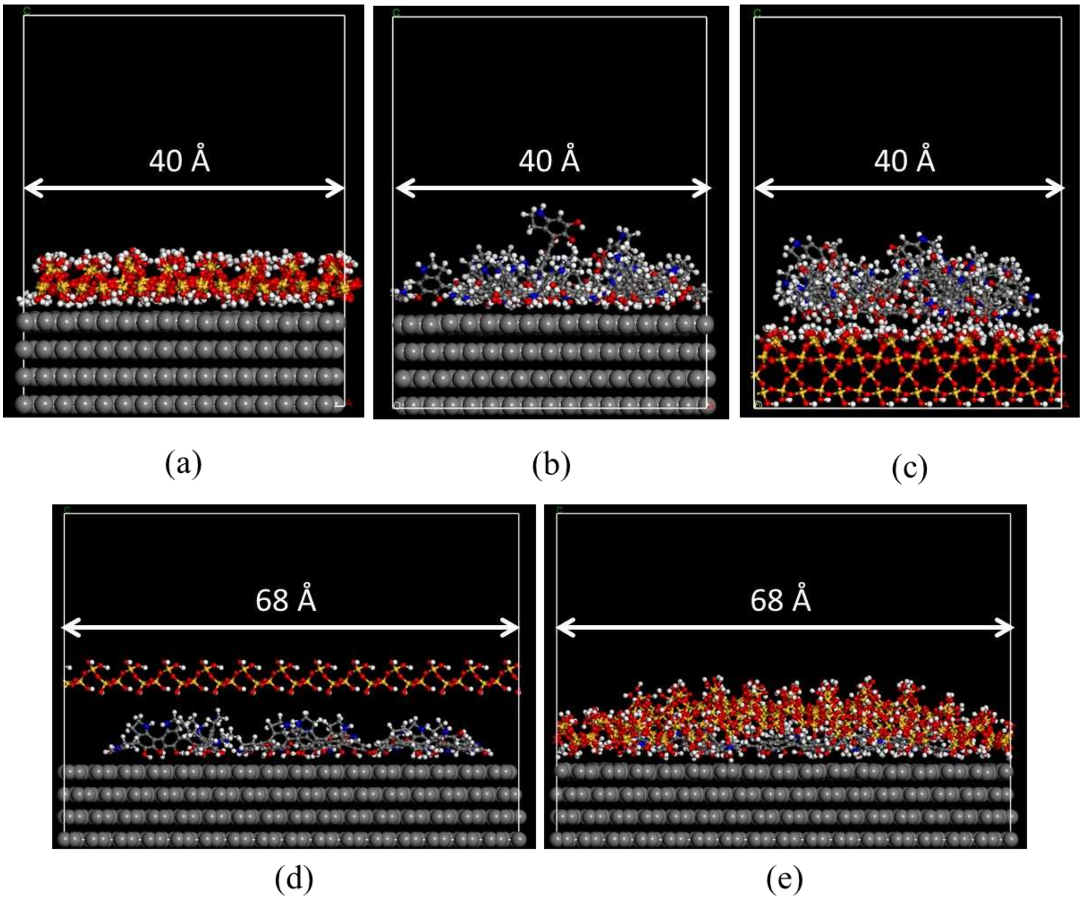
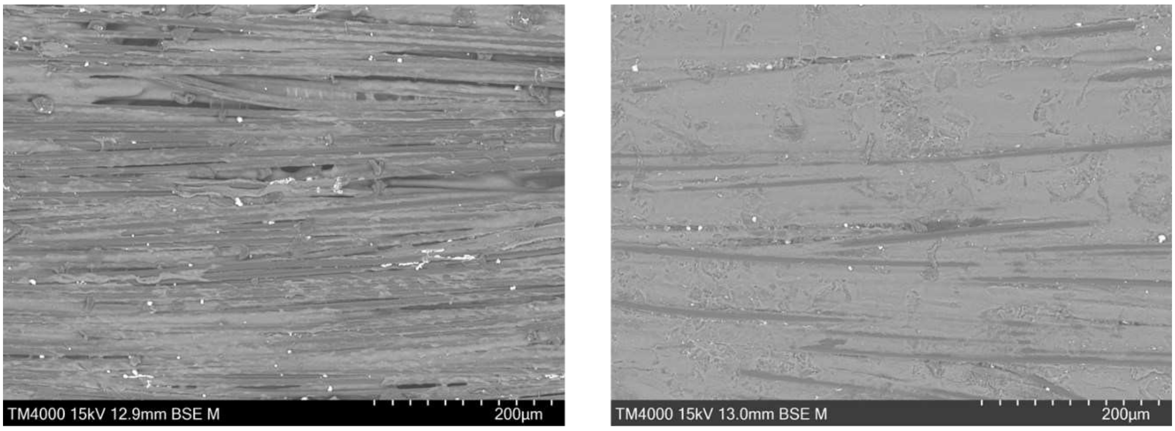


Figure S3. Interaction models after equilibration of (a) CF and SiO2, (b) CF and PDA and (c) PDA and SiO2; (d) Initial interaction and (e) equilibrated models of CF, SiO2 and PDA.



(a) (b)

Figure S4. Surface micrographs of (a) as-printed CCF/PPS (b) post-processed CCF/PPS using a salt-bath.

Table S1 Printing parameters for CCF/PPS filament.

Printing parameter	**Values**
Bed temperature	90 ℃
Nozzle temperature	320 ℃
Chamber temperature	25 ℃
Print speed	150 mm/min
Raster width	1.5 mm
Layer height	0.2 mm
Nozzle diameter	1.3 mm

Table S2 Designed dimensions and actual dimensions of as-printed and post-processed perforated part.

Perforated part	Designed model (mm)	As-printed part (mm)	Post-processed part (mm)	As-printed deviations (%)	Post-processed deviations (%)	Variations (%)
Major size	120.00	119.11	119.18	0.74	0.68	/
Minor size	13.00	12.88	13.22	0.92%	1.70	/
Thickness	2.00	2.22	1.99	/	/	10.36
Width	3.00	3.21	2.91	/	/	9.35

Table S3 Designed dimensions and actual dimensions of as-printed and post-processed stiffener part.

Stiffener part	Designed diameter (mm)	As-printed diameter (mm)	Post-processed diameter (mm)	As-printed deviations (%)	Post-processed deviations (%)	Variations (%)
Top inner	173.00	170.29	169.80	1.57	1.85	/
Top outer	191.00	190.83	188.84	0.09	1.13	/
Bottom inner	164.00	165.37	165.38	0.84	0.84	/
Bottom outer	200.00	200.29	199.37	0.15	0.31	/
Top width	18.00	20.54	19.04	/	/	7.30
Bottom width	36.00	34.92	33.99	/	/	2.67
Thickness	4.00	4.34	3.77	/	/	13.13