Electronic Supplementary Material (ESI) for Materials Horizons.
This journal is © The Royal Society of Chemistry 2021

Supplementary information

Imparting Conformational Memory for Material Adhesion

Fut (Kuo) Yang[†,a], Aleksander Cholewinski[†,a], John F. Honek[b], Wei Wei[c], Luzhu Xu[a], Wei Zhang[a,d], Michael A. Pope[a], and Boxin Zhao[a,*]

[†]Equally contributing authors
[a]University of Waterloo, Department of Chemical Engineering, Waterloo Institute for Nanotechnology, Institute for Polymer Research, Centre for Bioengineering and Biotechnology, Waterloo, Ontario, Canada N2L 3G1
[b]University of Waterloo, Department of Chemistry, Waterloo Institute for Nanotechnology, Waterloo, Ontario, Canada N2L 3G1
[c]University of California at Santa Barbara, Department of Molecular, Cell & Developmental Biology, Santa Barbara, California, USA 93106
[d]Current address: Southeast University, Jiangsu Key Laboratory of Advanced Metallic Materials, School of Materials Science and Engineering, Nanjing, China 211189
*Correspondence to: zhaob@uwaterloo.ca

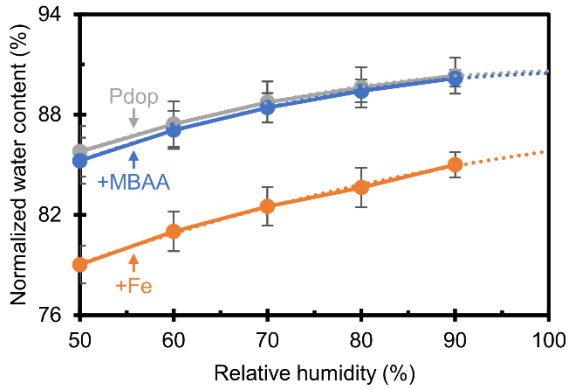
Supplementary video legends

Supplementary Video 1: Stretching of a calcium alginate hydrogel bonded on a strip of PDMS coated with and without conformed polydopamine coating.

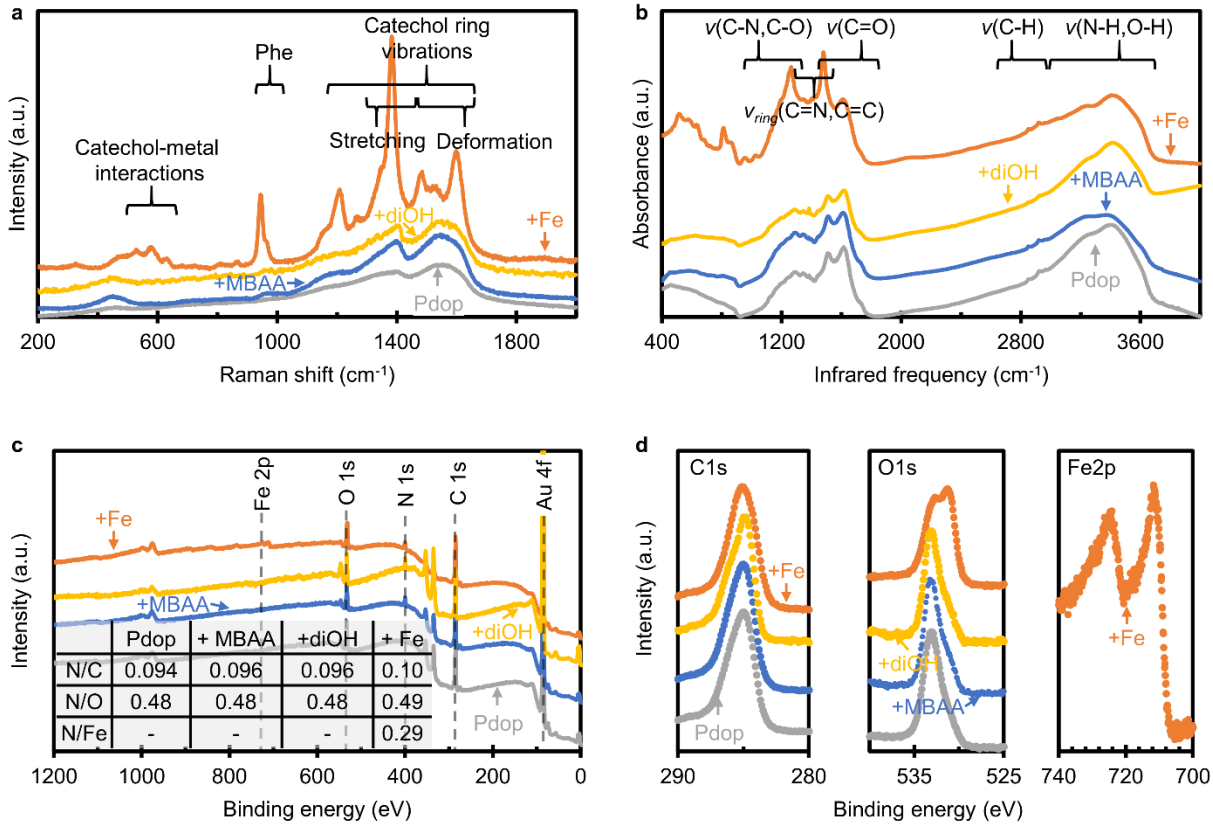
Supplementary Video 2: Lifting of a glass jar with the hybrid hydrogel and polydopamine as a joint in water.

Supplementary Video 3: Lifting of a soft drink bottle with an artificial mussel byssus formed by hydrogels.

Supplementary figures

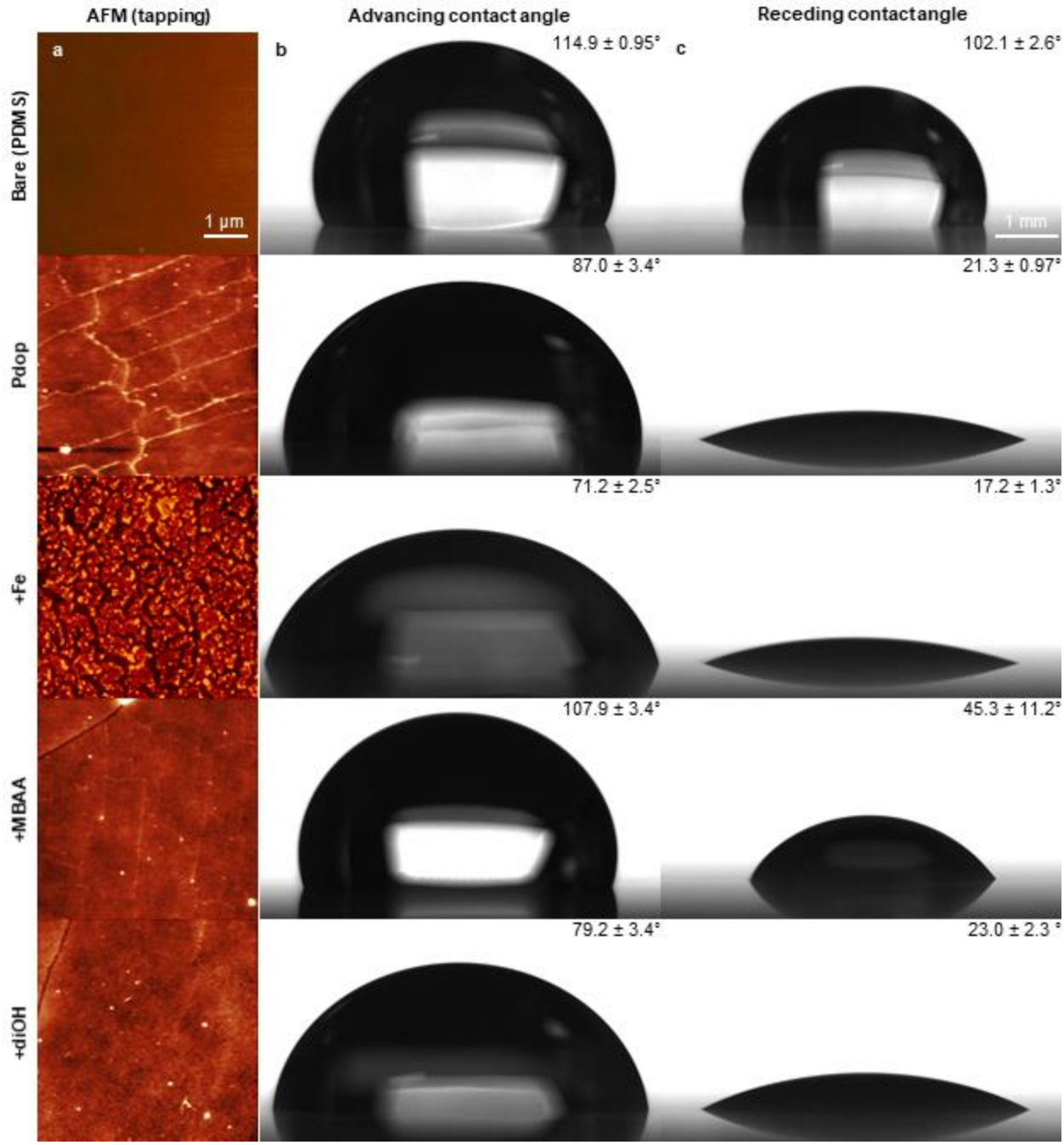


Supplementary Fig. 1: Measured water content of polydopamine aggregates in equilibrium with relative humidity. The normalized water content extrapolated to 100% relative humidity is equivalent to the water content of polydopamine in a fully hydrated environment. The error bars represent one standard deviation ($n \geq 3$).

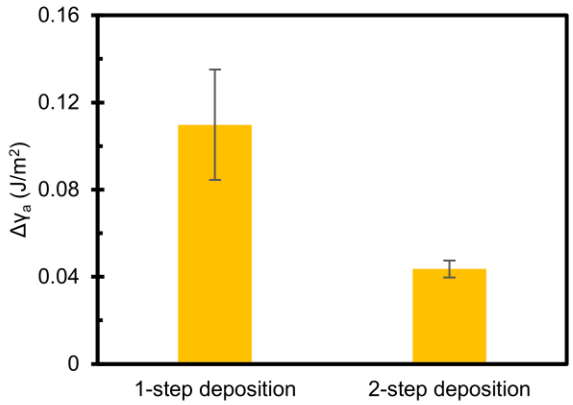


	Pdop	+ MBAA	+diOH	+ Fe
N/C	0.094	0.096	0.096	0.10
N/O	0.48	0.48	0.48	0.49
N/Fe	-	-	-	0.29

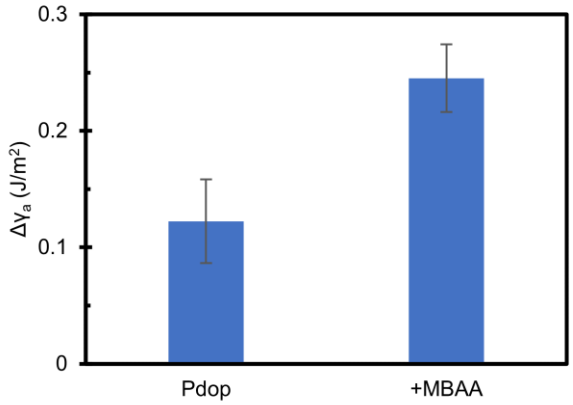
Supplementary Fig. 2: Chemical characterization of polydopamine. a, Raman spectrum of polydopamine aggregates. **b**, Fourier-transform infrared spectrum of polydopamine aggregates. **c,d**, X-ray photoelectron survey (**c**) and high-resolution spectrums of C1s, O1s, and Fe2p (**d**) of polydopamine coatings coated on gold.



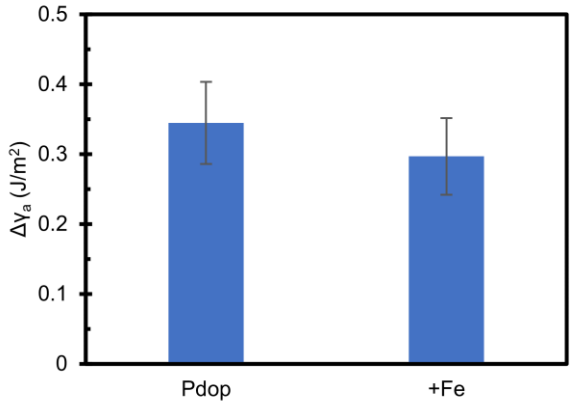
Supplementary Fig. 3: Physical characterization of polydopamine. a, Atomic force microscopy scans on polydopamine coatings coated on PDMS; the cracks were caused by the drying of polydopamine and the large difference in stiffness between the coating and the underlying substrate, where the pattern of cracks reflects the physical structures of polydopamine. **b,c**, Advancing (**b**) and receding (**c**) contact angles of water on polydopamine coatings coated on PDMS. The error bars represent one standard deviation ($n \geq 3$).



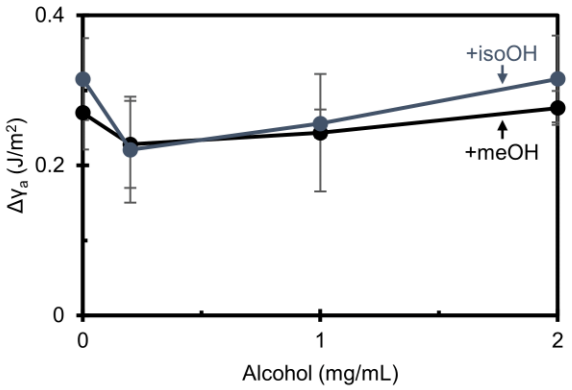
Supplementary Fig. 4: Apparent work of adhesion between polydopamine (+Fe) coating and alginate polymers. The polydopamine (+Fe) coating was formed by depositing ferric ions (0.2 mg/mL) together with polydopamine (1-step) or as a second stage after the deposition of pure polydopamine (2-step). The error bars represent one standard deviation ($n \geq 3$).



Supplementary Fig. 5: Apparent work of adhesion between +MBAA and polyacrylamide polymers. +MBAA was formed by depositing MBAA (0.2 mg/mL) with polydopamine. The polyacrylamide polymers were pre-polymerized and ultraviolet irradiation was not used during indentation. The error bars represent one standard deviation ($n \geq 3$).



Supplementary Fig. 6: Apparent work of adhesion between +Fe and polyacrylamide polymers. +Fe was formed by depositing Fe (0.2 mg/mL) with polydopamine. The error bars represent one standard deviation ($n \geq 3$).



Supplementary Fig. 7: Apparent work of adhesion between polydopamine deposited with isopropanol (+isoOH) or methanol (+meOH) and polyacrylamide polymers at different alcohol concentrations. The error bars represent one standard deviation ($n \geq 2$).