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Supplementary Material

Fe_3O_4/poly(acrylic acid) Composite Hydrogel for the Removal of Methylene Blue and Crystal Violet from Aqueous Media

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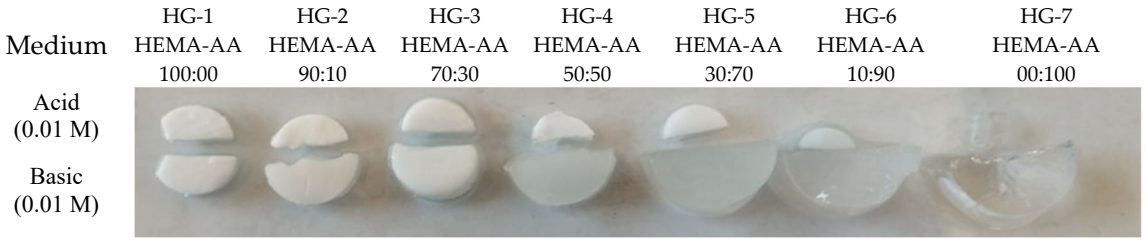
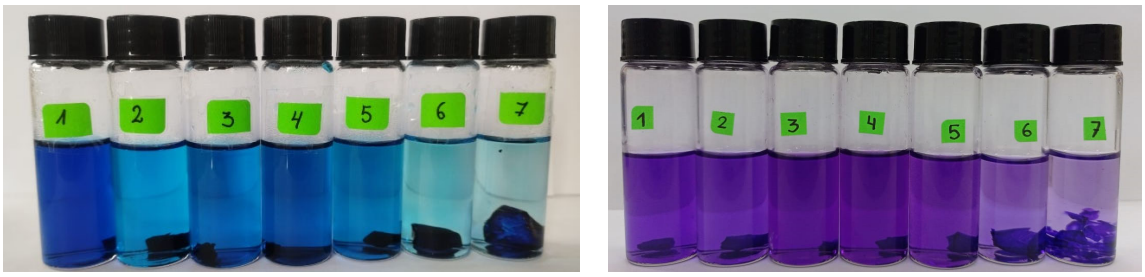


Figure S1. Acid–base response of hydrogel based on 2-hydroxyethyl methacrylate (HEMA) and acrylic acid (AA).



(**a**) (**b**)

Figure S2. Screening of (**a**) MB and (**b**) CV adsorption with hydrogel based on 2-hydroxyethyl methacrylate (HEMA) and acrylic acid (AA). (The hydrogel that showed the best potential to adsorb MB and CV dyes was the one prepared with 100% AA, vial number 7).

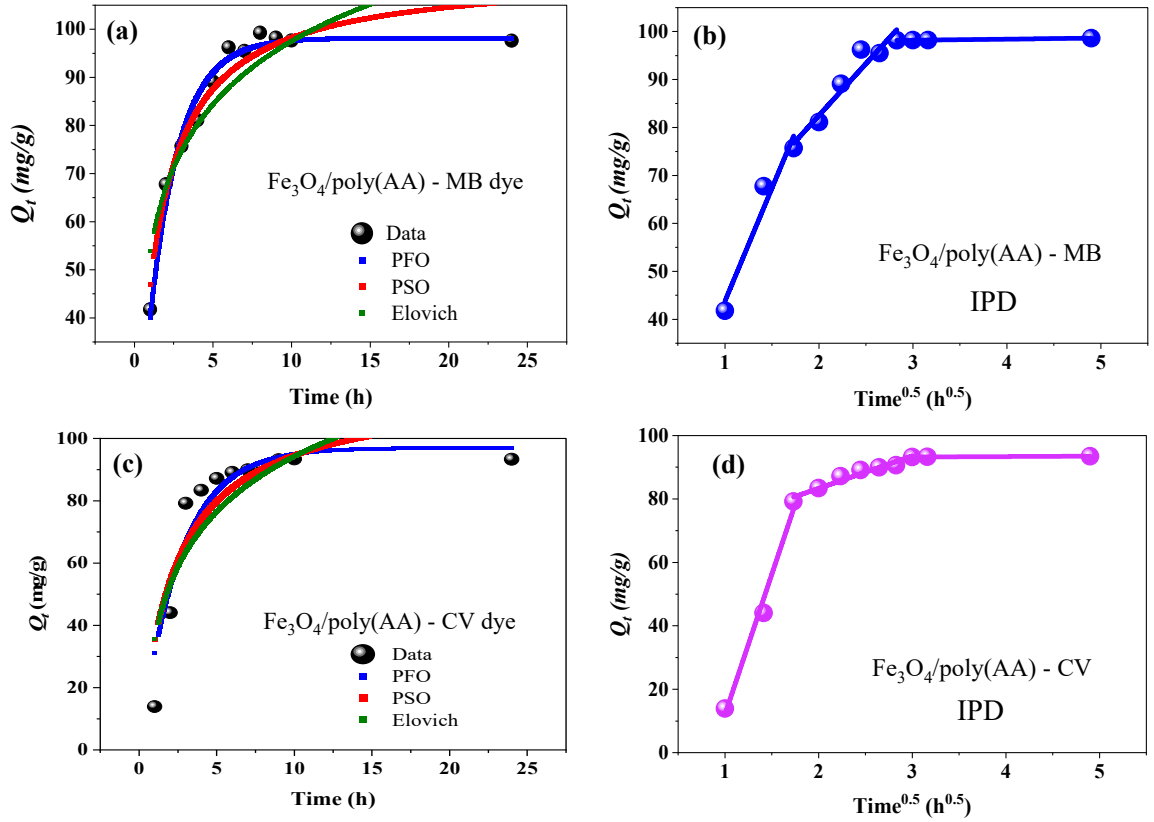


Figure S3. Adsorption kinetic models for MB (**a**, **b**) and CV (**c**, **d**) onto Fe_3O_4/poly(AA) hydrogel.

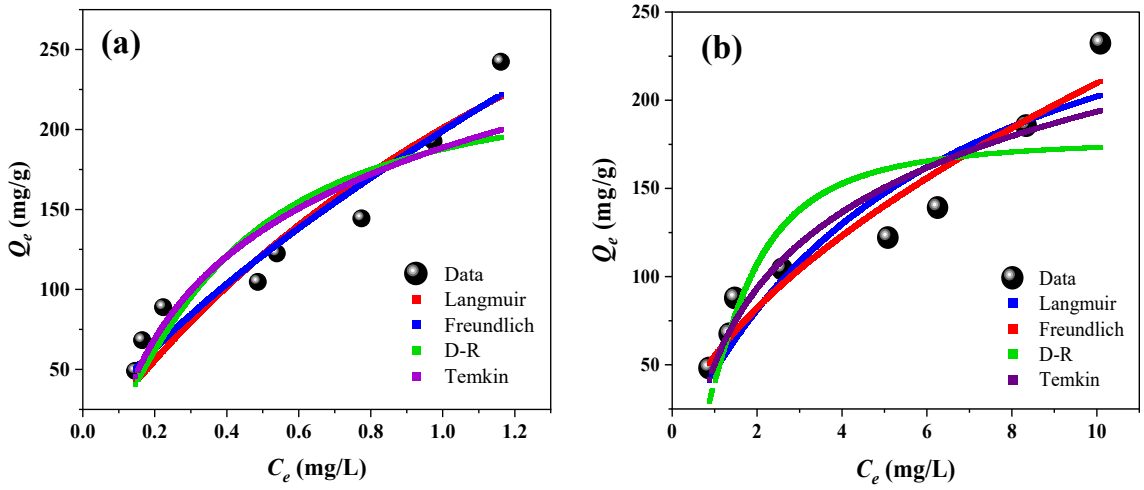


Figure S4. Adsorption isotherm models for MB (**a**) and CV (**b**) onto Fe_3O_4/poly(AA) hydrogel.

Table S1. Comparison of Fe_3O_4/poly(AA) hydrogel with other adsorbents reported in the literature.

Adsorbents	Experimental Conditions	Dye	Q_{max} (mg/g)	Kinetic/Isotherm Models	Removal % /Reusability (Final cycle)	Ref.
P(HEMA-Co-AA)	C_0:100-1500 mg/L, 0.2 g, pH: 8, t: 24 h	MB	197	PSO/-	<95/3rd	[1]
Fe_3O_4-CMC-g-p(AA-co-AM)	C_0:0-200 mg/L, T: 298 K, 0.15 g, pH: 7, t: 120 min	MB	34.3	PSO/Langmuir	83.5/5th	[2]
β-CD/MGO/PAA	C_0: 250–3500 mg/L, T: 298 K, 0.04 g, pH: 11, t: 3 h	MB	2802.67	PFO/Langmuir	98/8th	[3]
Fe_3O_4/poly(AA)	C_0:50-250 mg/L, T: 288 K, 1 g/L, pH: 6.8, t: 24 h	MB	571.00	PSO/Freundlich	>95/10th	This work
AM-GO-SA	C_0:10-300 mg/L, T: 303 K, 5 g/L, pH: 8, t: 4 h	CV	100.30	PSO/Elovich	>80/10th	[4]
AAMPSA-AAc-AAm/OG	C_0:10-50 mg/L, T:298 K, 0.02 g, pH: 5, t:10 h	CV	149.30	PSO/Freundlich	74/5th	[5]
Fe_3O_4/CMC-g-poly(AA-co-AMPS)	C_0:25-100 mg/L, T:318, 0.05 g/L, pH: 7, t: 2.5 h	CV	53.97	PSO/Langmuir	54/4th	[6]
Fe_3O_4/poly(AA)	C_0:50-250 mg/L, T: 288 K, 1 g/L, pH: 6.8, t: 24 h	CV	321.00	PSO/Langmuir	>95/10th	This work

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