Supporting information

Preparation of boronic acid-functionalized cryogels using modular and clickable building blocks for bacteria separation

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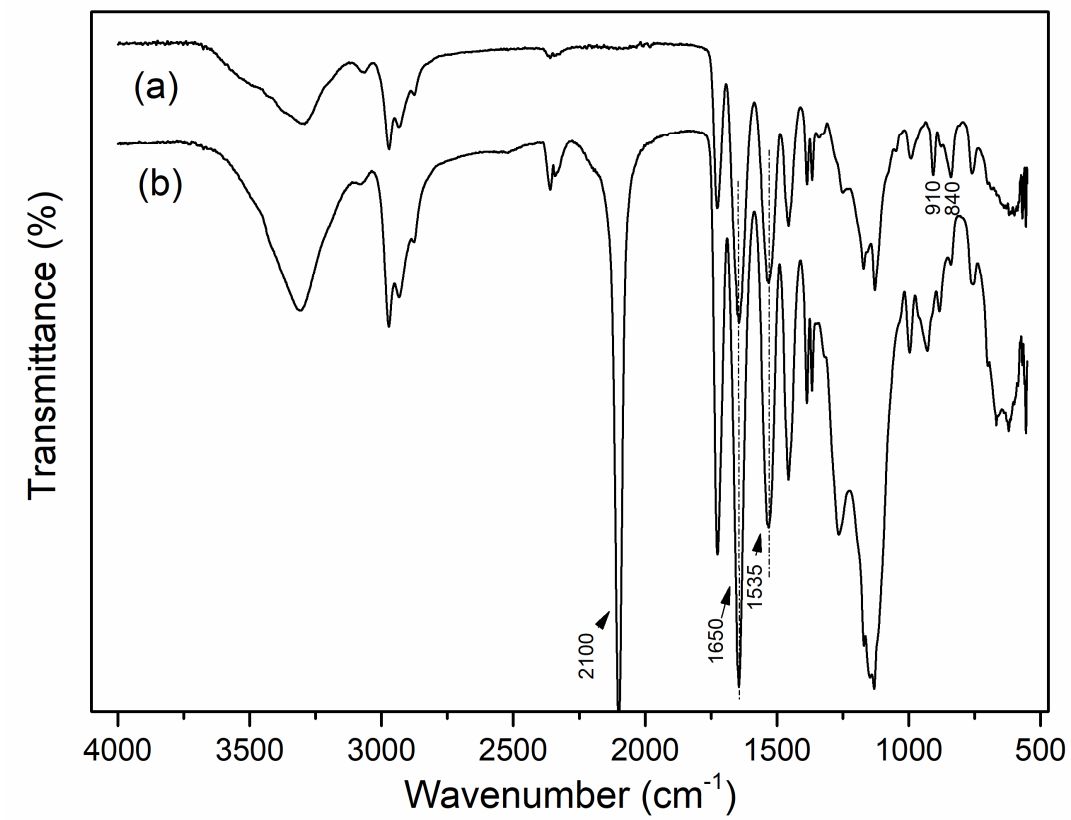

Figure S1. FT IR spectra of (a) poly(NIPAm-*co*-GMA) and (b) poly(NIPAm-*co*-GMA)@N_3.

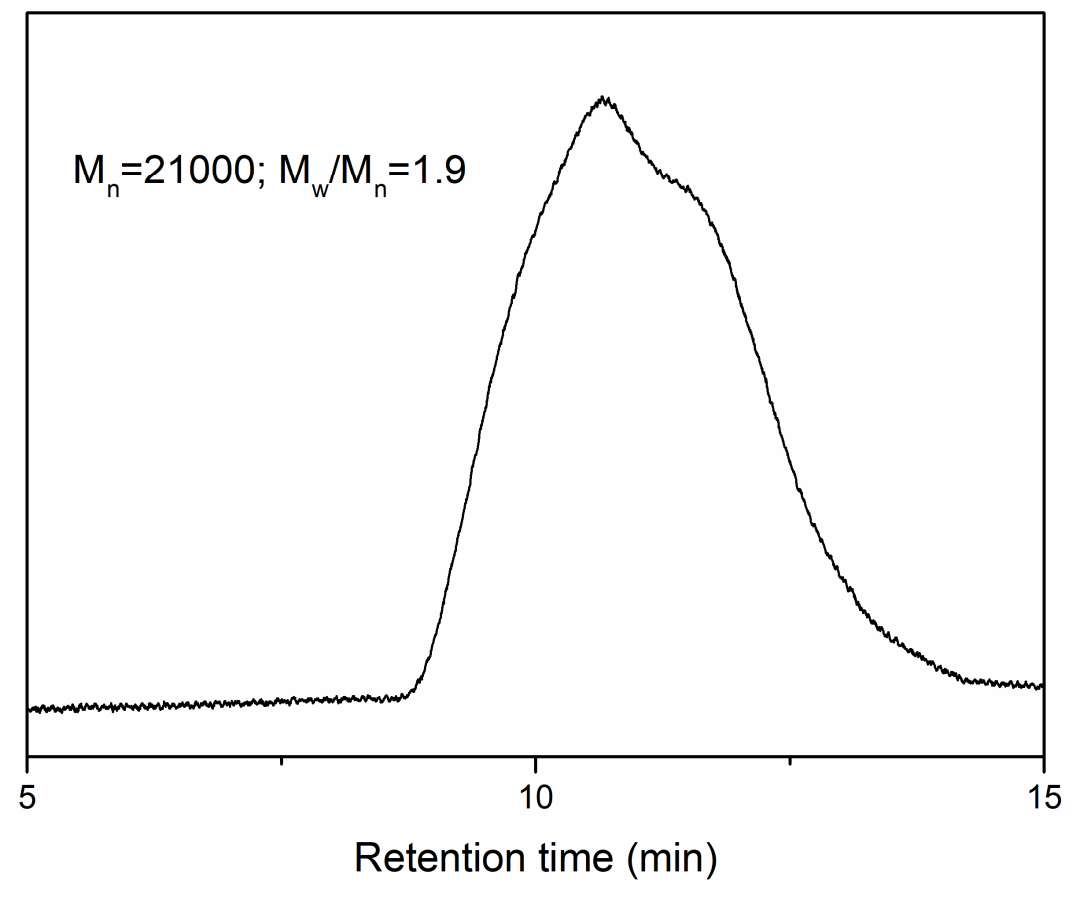

Figure S2. GPC trace of poly(NIPAm-*co*-GMA)@N_3.

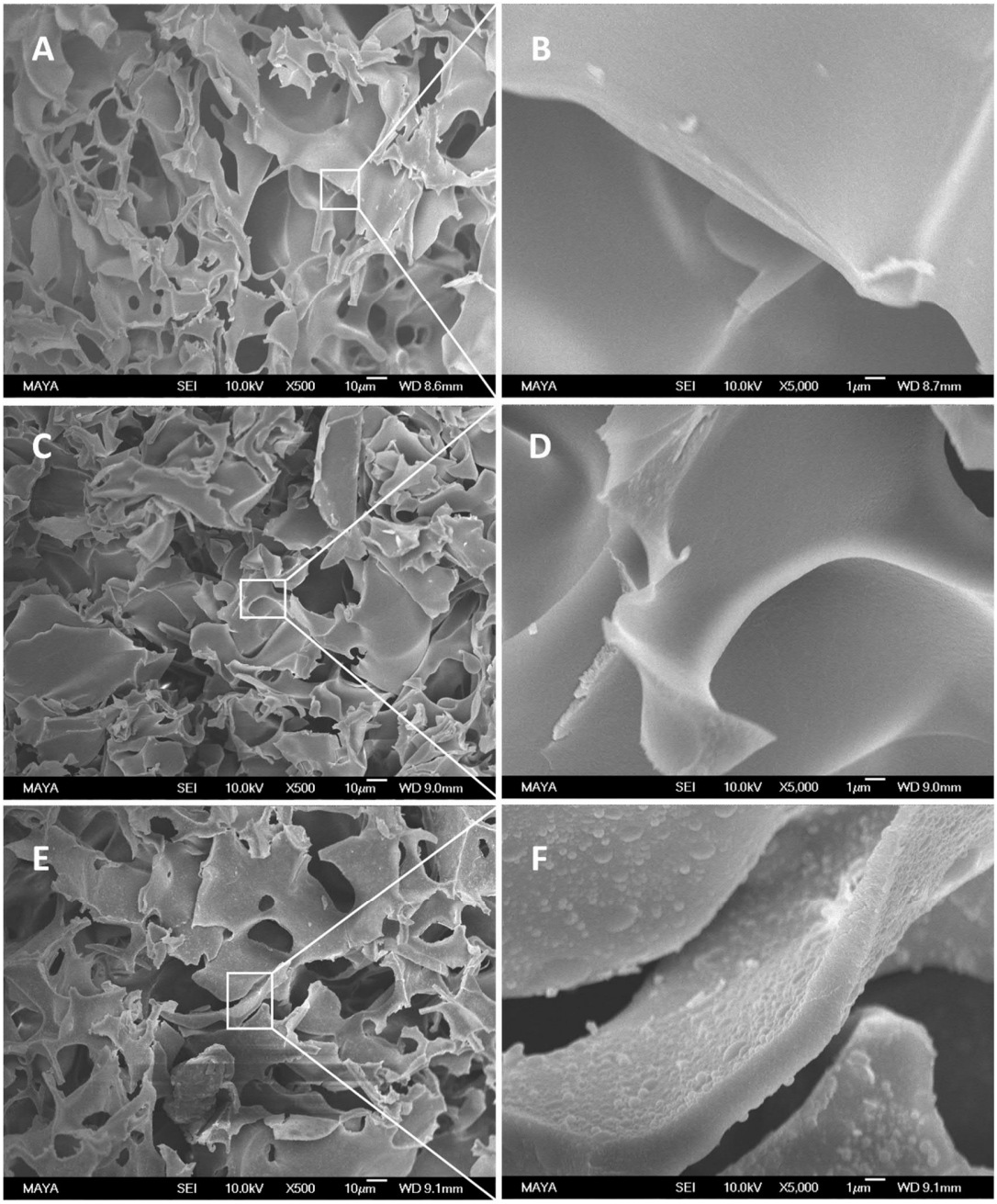

Figure S3. SEM images of AG-N_3 cryogel (A, B), AG-alkyne cryogel (C, D), AG-alkyne@polymer-N_3 cryogel (E, F). The scale bars are 10 μm in (A), (C), (E), and 1 μm in (B), (D), (F).

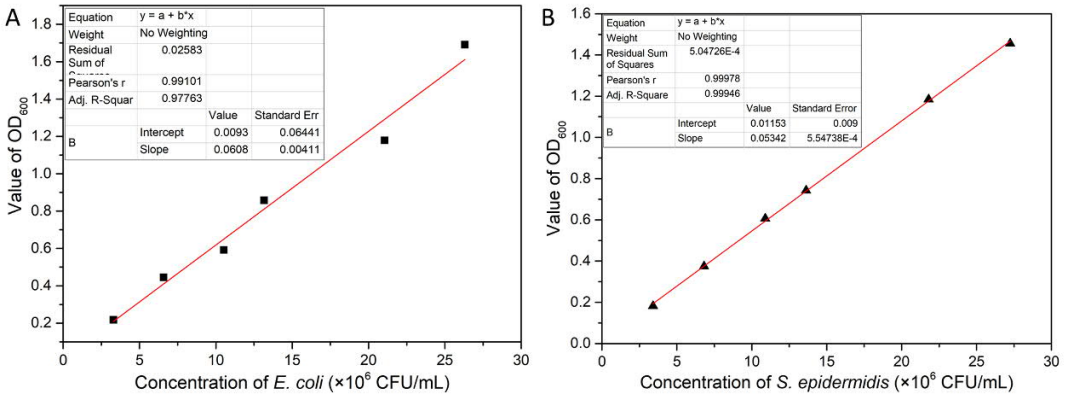

Figure S4. Calibration plots for quantification of (A) *E. coli* and (B) *S. epidermidis*.

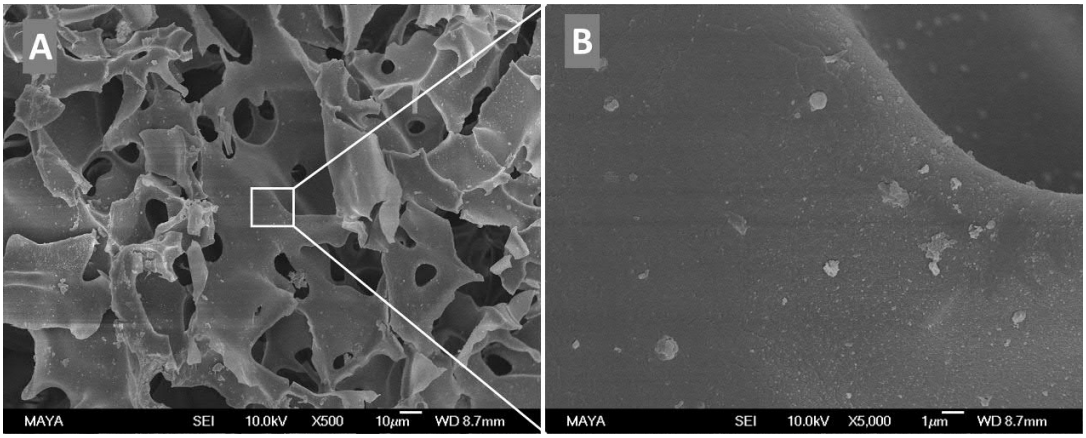

Figure S5. SEM images of AG-alkyne@polymer-pBA cryogel loaded with *S. epidermidis*, after elution using 0.5 M fructose (in 20 mM PBS, pH 9.0, containing 0.5 M NaCl). The scale bars are 10 μm in (A) and 1 μm in (B).

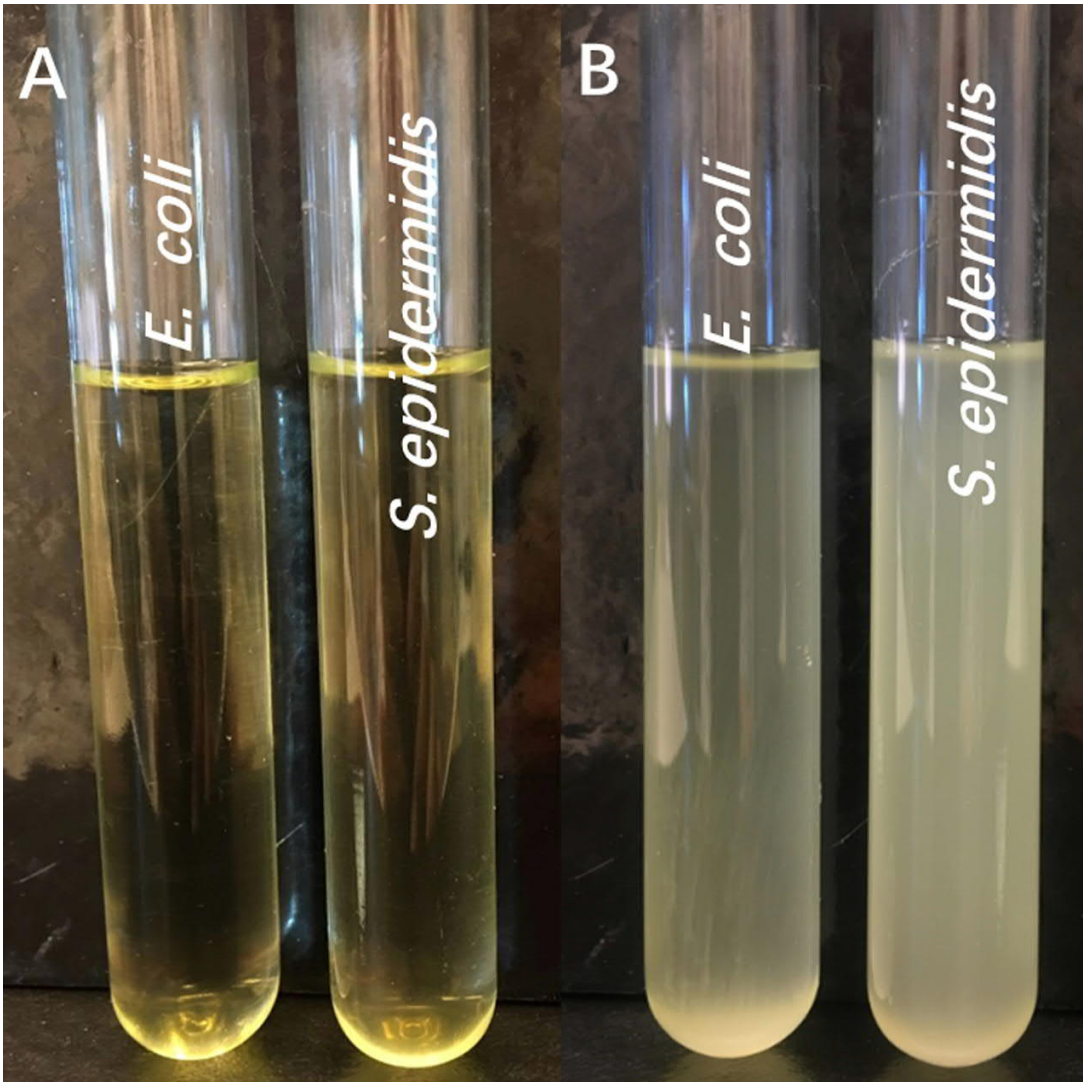

Figure S6. Eluted *E. coli* and *S. epidermidis* before (A) and after (B) cultivation in LB medium at 37 ℃ for 16 h. The bacteria suspension (0.5 mL) eluted by 0.5 M fructose-PBS buffer was transferred into 8 mL of fresh LB medium for cultivation.

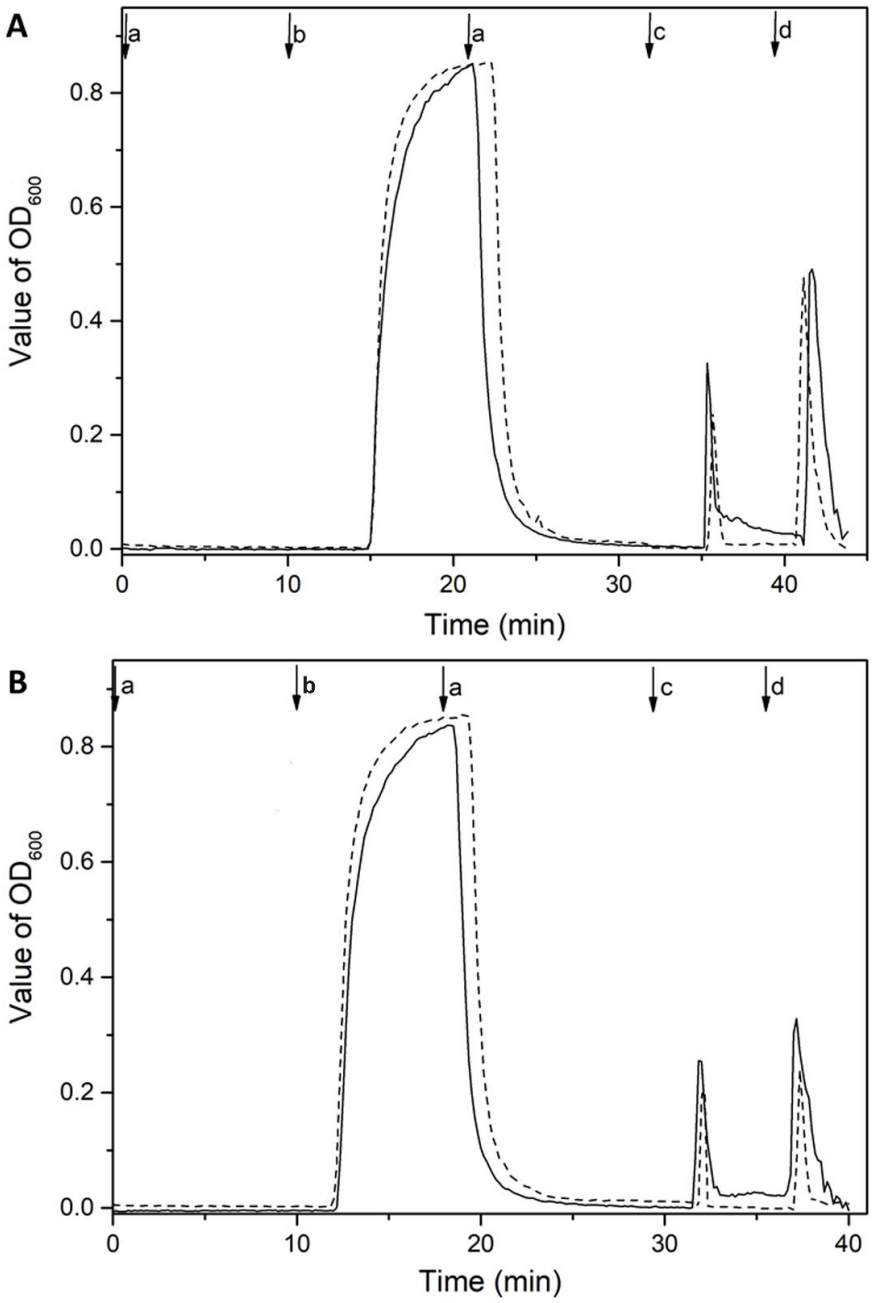

Figure S7. Chromatograms of bacteria separation tested with (A) *E. coli* and (B) *S. epidermidis* on different cryogels: (——) AG-alkyne@polymer-pBA, (- - -) AG-BA. The arrows indicate: (a) loading of 10 mM PBS (pH 8.0), (b) loading of *E. coli* or *S. epidermidis* suspensions ($OD_{600} \approx 1$) in 10 mM PBS (pH 8.0), (c) elution with 0.5 M fructose in 20 mM phosphate buffer (pH 9.0, containing 0.5 M NaCl), (d) washing with 100 mM HAC.

Table S1. Physical properties of AG and AG-alkyne@polymer-pBA cryogel

Temperature	Cryogel samples	Swelling Degree (g H_2O/g Cryogel)	Macroporosity (Volume %)
25℃	AG cryogel	15.13 ± 0.07	72.42 ± 0.01
	AG-alkyne@polymer-pBA cryogel	13.38 ± 0.06	69.05 ± 0.01
40℃	AG cryogel	14.84 ± 0.06	-
	AG-alkyne@polymer-pBA cryogel	11.95 ± 0.11	-

Table S2. Comparison of binding capacities of different adsorbents towards bacteria

Adsorbent	Ligands	Targets	Sample	Binding Capacity	Ref.
AG@epoxy@PEI-DFFPBA	boronic acid	*Salmonella* spp., *S. aureus*	25% cow milk; water	*Salmonella* spp.: (906.60 ± 15.73) × 10^7 CFU/g *S. aureus*: (582.59 ± 13.19) × 10^7 CFU/g	[1]
N-methylimidazolium functionalized magnetic particles	N-methylimidazolium	*Listeria monocytogenes*	mineral water and tap water	6.22 × 10^8 CFU/mg	[2]
AGe-Si@brush-pBA	boronic acid	yeast cell	-	6 mg/g	[3]
PDA@Fe_3O_4 nanoparticles	ion-exchange	*S. aureus*	tap water	1.2 × 10^8 CFU/mg	[4]
Si@poly(NIPAm-*co*-GMA)@PCAPBA	boronic acid	*E. coli*, *S. epidermids*	water, 25% milk	*E. coli:* 13.4 × 10^7 CFU/mg *S. epidermids:* 3.36×10^9 CFU/g	[5]
Vancomycin modified PEGylated-magnetic nanoparticles	vancomycin	*Listeria monocytogenes*	lettuce	~ 2.4 × 10^7 CFU/mg	[6]
AG-alkyne@polymer-pBA cryogel	boronic acid	*E. coli*, *S. epidermids*	water, 25% milk	*E. coli:* 2.15×10^9 CFU/g *S. epidermids:* 3.36×10^9 CFU/g	This work

Table S3. Comparison of different composite cryogel for chromatographic separation

Cryogels	Ligands	Targets	Advantages / Disadvantages	Ref.
Organic-inorganic cryogel composite	boronic acid	nucleosides	Synthesis under mild conditions; high surface area; simple synthesis conditions	[7]
Tyrosine-imprinted cryogel	molecularly imprinted polymer	tyrosine	High selectivity and good reusability	[8]
Poly(Hydroxyethyl Methacrylate) cryogel	antibody	human immunoglobulin M	High specificity and biocompatibility. High-cost	[9]
PolyAdenine	adenine methacrylate	RNA	Sing-step synthesis; high RNA binding capacities; simple operation procedures	[10]
AGe-Si@brush-pBA	boronic acid	yeast cell; haemoglobin	High surface area and multiple affinity ligands. Complicated synthesis procedures	[3]
poly(HEMA-*co*-MAAc) cryogel	ion-exchange	cisplatin	High hydrophilicity and binding capacities. Selectivity limited	[11]
AG-alkyne@polymer-pBA cryogel	boronic acid	*E. coli*, *S. epidermidis*	High ligand density, high binding capacity for bacteria, simple and modular synthesis	This work

Reference

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