Mussel-inspired hydrogel for fast fabrication of flexible SERS tape for point-of-care testing of β-blockers

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Table S1. Composition of the hydrogels

Samples	AA (mL)	$Al(NO_3)_3$ •$9H_2O$ (g)	CHI (g)	GA (g)	BIS (mg)	KPS (g)	Deionized water (g)
P	3	0	0	0	10	0.08	10
P-0.3C	3	0	0.3	0	10	0.08	10
P-0.08Al	3	0.08	0	0	10	0.08	10
P-0.3C-0.06GA	3	0	0.3	0.06	10	0.08	10
P-0.3C-0.06GA-0.02Al	3	0.02	0.3	0.06	10	0.08	10
P-0.3C-0.06GA-0.04Al	3	0.04	0.3	0.06	10	0.08	10
P-0.3C-0.06GA-0.06Al	3	0.06	0.3	0.06	10	0.08	10
P-0.3C-0.06GA-0.08Al	3	0.08	0.3	0.06	10	0.08	10
P-0.3C-0.06GA-0.10Al	3	0.10	0.3	0.06	10	0.08	10
P-0.08Al-0.06GA	3	0.08	0	0.06	10	0.08	10
P-0.15C-0.06GA-0.08Al	3	0.08	0.15	0.06	10	0.08	10
P-0.45C-0.06GA-0.08Al	3	0.08	0.45	0.06	10	0.08	10
P-0.3C-0.08Al	3	0.08	0.3	0	10	0.08	10
P-0.3C-0.01GA-0.08Al	3	0.08	0.3	0.01	10	0.08	10
P-0.3C-0.02GA-0.08Al	3	0.08	0.3	0.02	10	0.08	10
P-0.3C-0.04GA-0.08Al	3	0.08	0.3	0.04	10	0.08	10
P-0.3C-0.06GA-0.086Fe*	3	0.086	0.3	0.08	10	0.08	10
P-0.3C-0.06GA-0.051Cu*	3	0.055	0.3	0.08	10	0.08	10
P-0.3C-0.06GA-0.085Cr*	3	0.063	0.3	0.08	10	0.08	10

*As for P-0.3C-0.06GA-0.086Fe, P-0.3C-0.06GA-0.055Cu and P-0.3C-0.06GA-0.063Cr, 0.086 g of $Fe(NO_3)_3 \cdot 9H_2O$, 0.055 g of $Cu(NO_3)_2 \cdot 3H_2O$ or 0.063 g of $Cr(NO_3)_3 \cdot 9H_2O$ was added instead of $Al(NO_3)_3 \cdot 9H_2O$. All the samples listed here were synthesized following the same methodology mentioned in the "**Preparation of hydrogel**" session.

Table S2. Experimental vibrational band wavenumbers of BSE, MET, ESE and ACE.

BSE		MET		ESE		ACE	
363	δ(O-CH$_2$)	357	δ(OH)+δ(CH)+δ(CH$_2$)+δ(CH$_3$)	336	δ(O-CH$_2$)		
485	ρ(CH$_2$)			486	ρ(CH$_2$)	485	ρ(CH$_2$)
				575	τ(CCC ring)+δ(OC-NH)	571	τ(CCC ring)+δ(OC-NH)
644	δ(CCC ring)+ρ(CH$_2$)	643	in-plane ring deformation	644	δ(CCC ring)+ρ(CH$_2$)	644	δ(CCC ring)
749	δ(NH)+δ(CC ring)	749	δ(CCC ring)+ρ(CH$_2$)	748	δ(CCC ring)+δ(NH)	750	δ(CCC ring)+δ(NH)
821	ω(CH)+ring breathing	821	γ(CH ring)	816	γ(CH ring)	818	γ(CH ring)
889	ν(CO)+ν(NH)	890	ring breathing	890	ν(CO)+ν(NH)	890	ν(CO)+ν(NH)
910	ν(CO)+ρ(CH$_2$)	911	ν_{as}(CCN)+δ(CH$_2$)	911	ν(CO)+ρ(CH$_2$)	912	ν(CO)+ρ(CH$_2$)
953	δ(CH$_3$)+δ(CH$_2$)	952	δ(CH$_3$)+δ(CH$_2$)	955	δ(CH ring)+δ(CH$_2$)	952	δ(CH ring)+δ(CH$_2$)
999	ν(CO)+ρ(CH$_2$)	998	δ(CH ring)+in plane ring deformation	998	ν(CO)+ρ(CH$_2$)	999	ν(CO)+ρ(CH$_2$)
		1063	ν(OC)				
1073	ν(OC)	1075	ν(CH-CH)+δ(CH$_3$)+δ(CH$_2$)	1077	ν(OC)	1075	ν(CCH)+δ(CCH)
1102	ν(CC)+δ(CCH)	1103	ν_{as}(OCC)	1102	ν(CC)	1103	ν(CC)
1115	δ(CH ring)	1116	ρ(CH$_2$)+ρ(CH$_3$)+ρ(NH)	1119	ρ(CH$_2$)+ρ(CH$_3$)+ρ(NH)	1118	δ(CH ring)
1176	ν(CC)+δ(CH ring)	1176	ρ(CH$_2$)+ρ(CH$_3$)			1178	ν(OCC)+δ(CH ring)
		1208	δ(OH)+δ(CH)	1203	δ(CC ring)	1207	δ(CC ring)
1217	ν_{as}(CC ring)+τ(CH$_2$)	1218	ν_{as}(CC ring)+τ(CH$_2$)	1215	ν_{as}(OC)	1217	ν_{as}(OC)
1244	τ(CH$_2$)+ρ(CH$_2$)	1244	ν_{as}(OCC)+δ(CC)	1244	τ(CH$_2$)+ρ(CH$_2$)	1244	τ(CH$_2$)+ρ(CH$_2$)
1256	τ(CH$_2$)+ρ(CH$_2$)	1257	ρ(CH$_2$)	1252	ν_{as}(OCC)+δ(CH)	1257	ν_{as}(OCC)+δ(CH)
1286	δ(CH$_2$)+δ(OH)	1285	δ(CH$_2$)+δ(OH)	1270	δ(CH$_2$)+δ(OH)	1285	δ(CH$_2$)+δ(OH)
1323	δ(NH)+δ(CH)	1324	δ(NH)+δ(CH)	1315	δ(NH)+δ(CH)	1323	δ(NH)+δ(CH)
1336	ω(CH$_2$)+δ(CH)	1335	ω(CH$_2$)+δ(CH)			1337	ω(CH$_2$)+δ(CH)
1357	ω(CH$_2$)+τ(CH$_2$)	1357	ω(CH$_2$)+τ(CH$_2$)/δ(CH$_3$)	1355	ω(CH$_2$)+τ(CH$_2$)	1357	ω(CH$_2$)+τ(CH$_2$)
1458	δ(CH$_2$)	1455	δ_{as}(CH$_3$)	1458	δ_{as}(CH$_3$)	1458	δ_{as}(CH$_3$)
1570	ν_{as}(CC ring)+δ(CH ring)	1570	ν_{as}(CC ring)+δ(CH ring)	1569	ν_{as}(CC ring)+δ(CH ring)	1570	ν_{as}(CC ring)+δ(CH ring)
1597	ν(CC ring)+δ(CH ring)	1597	ν(CC ring)+δ(CH ring)			1597	ν(CC ring)+δ(CH ring)
1615		1615		1615	ν(CC ring)+δ(CH ring)	1615	

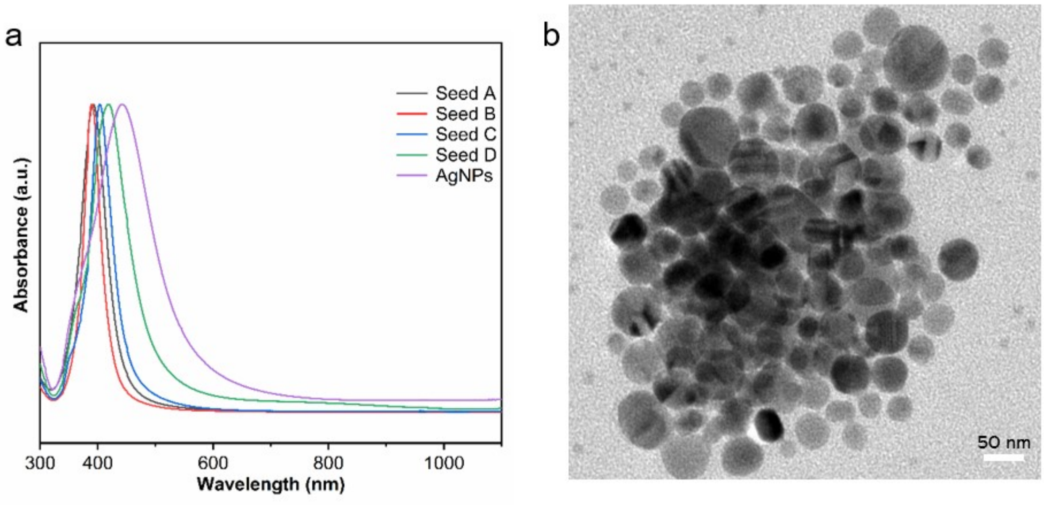

Fig. S1. (a) UV-vis spectrum of the solution of synthesized Seed A, B, C, D and AgNPs. (b) TEM image of AgNPs.

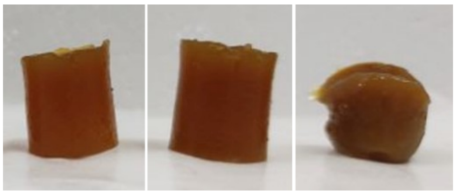

Fig. S2. Large amount of CHI (from left to right: 0.45, 0.5, 0.6g) failed to reach gelation. Gel with 0.6 g CHI was too soft to reach gelation.

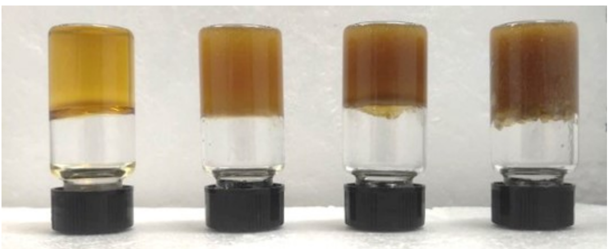

Fig. S3. The impact of different Al^{3+} (from left to right: 0, 0.02, 0.04, 0.10g) contents on gelation of the GA-containing samples.

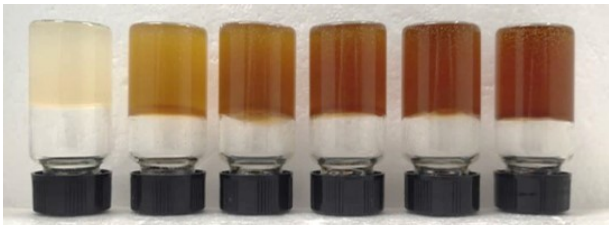

Fig. S4. The impact of different GA (from left to right: 0, 0.01, 0.02, 0.04, 0.06, 0.08g) contents on gelation.

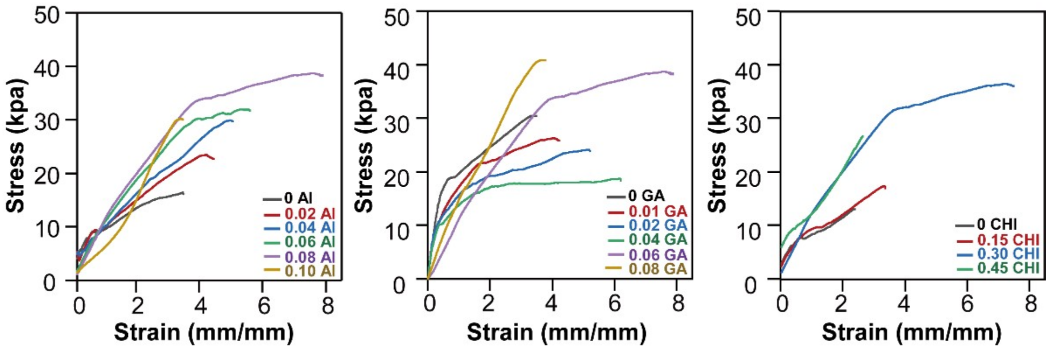

Fig. S5. The tensile curves of (a) P-0.3C-0.06GA-(0, 0.02, 0.04, 0.06, 0.08, 0.10)Al, (b) P-0.3C-(0, 0.01, 0.02, 0.04, 0.06, 0.08)GA-0.08Al and (c) P-(0, 0.15, 0.3, 0.45)C-0.06GA-0.08Al.

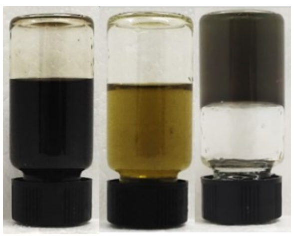

Fig. S6. Al^{3+} in P-0.3C-0.06GA-0.08Al was replaced by equal molar amount of Fe^{3+}, Cu^{2+} and Cr^{3+} (from left to right), making P-0.3C-0.06GA-0.086Fe, P-0.3C-0.06GA-0.051Cu and P-0.3C-0.06GA-0.085Cr hydrogels. Only the gelation of P-0.3C-0.06GA-0.085Cr succeeded.

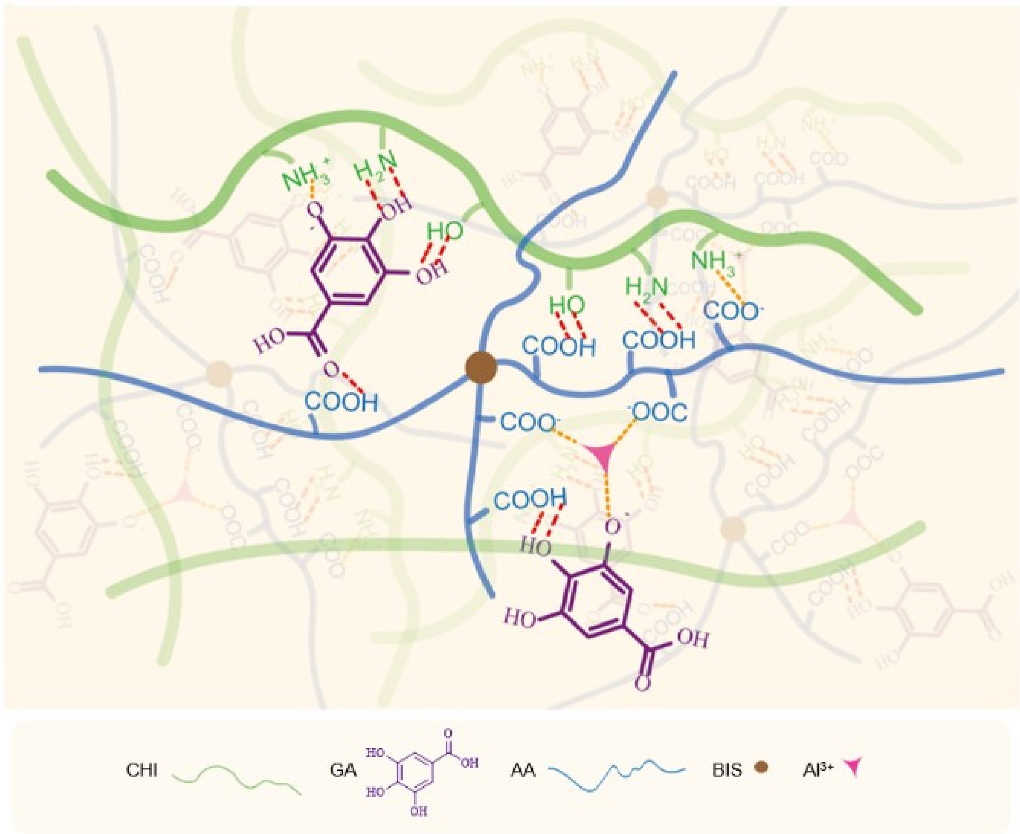

Fig. S7. Multiple hydrogen bonds and electrostatic interactions in P-0.3C-0.06GA-0.08Al hydrogel.

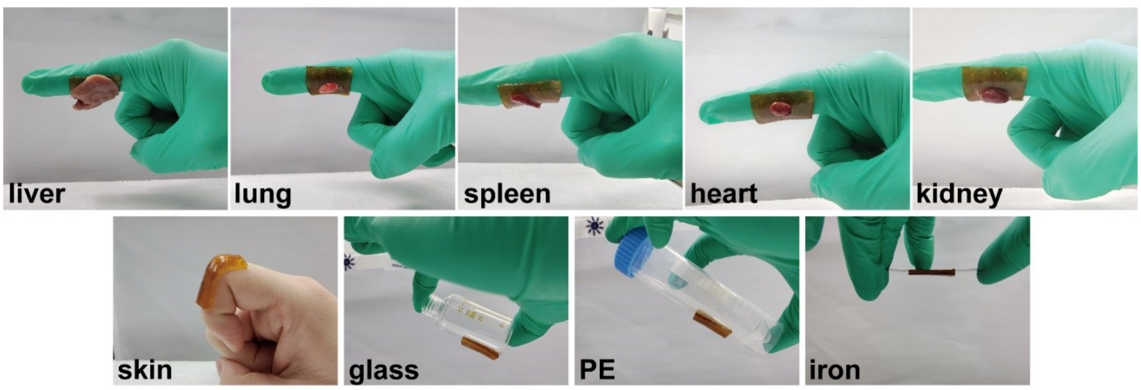

Fig. S8. Adhesiveness of P-0.3C-0.06GA-0.08Al to various surfaces including: liver, lung, spleen, heart, kidney, skin, glass, PE and iron.

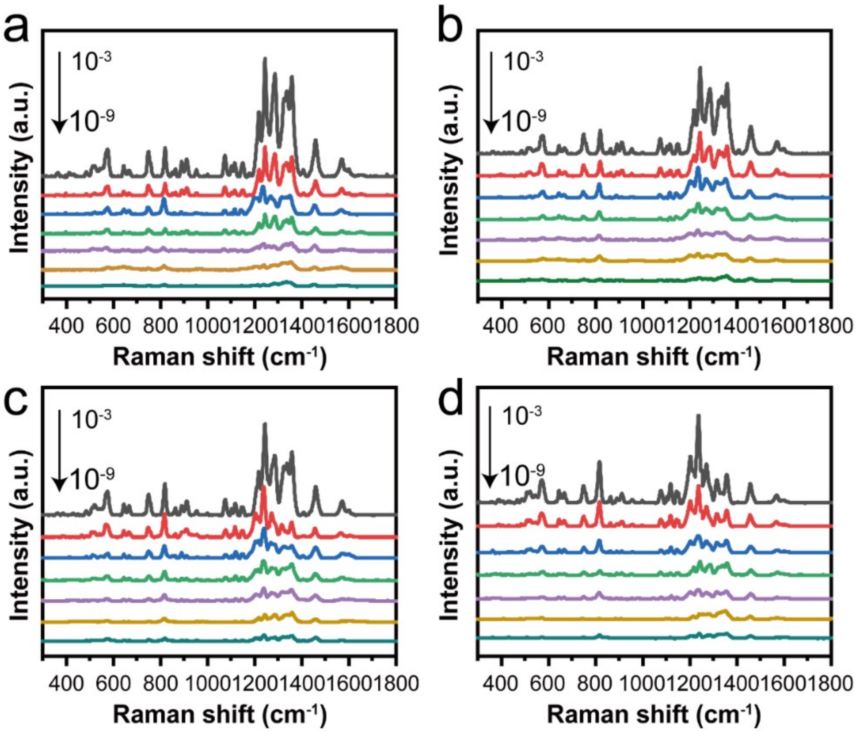

Fig. S9. SERS spectra of (a) BSE, (b) MET, (c) ACE and (d) ESE with a concentration of 10^{-3}-10^{-9} M. 5 μL of BSE, MET, ACE or ESE simulated urine solution was dropped onto the substrate for each sample. Raman spectra were collected by a portable Raman spectrometer. Exposure time was 1500 ms, and laser wavelength was 785 nm.

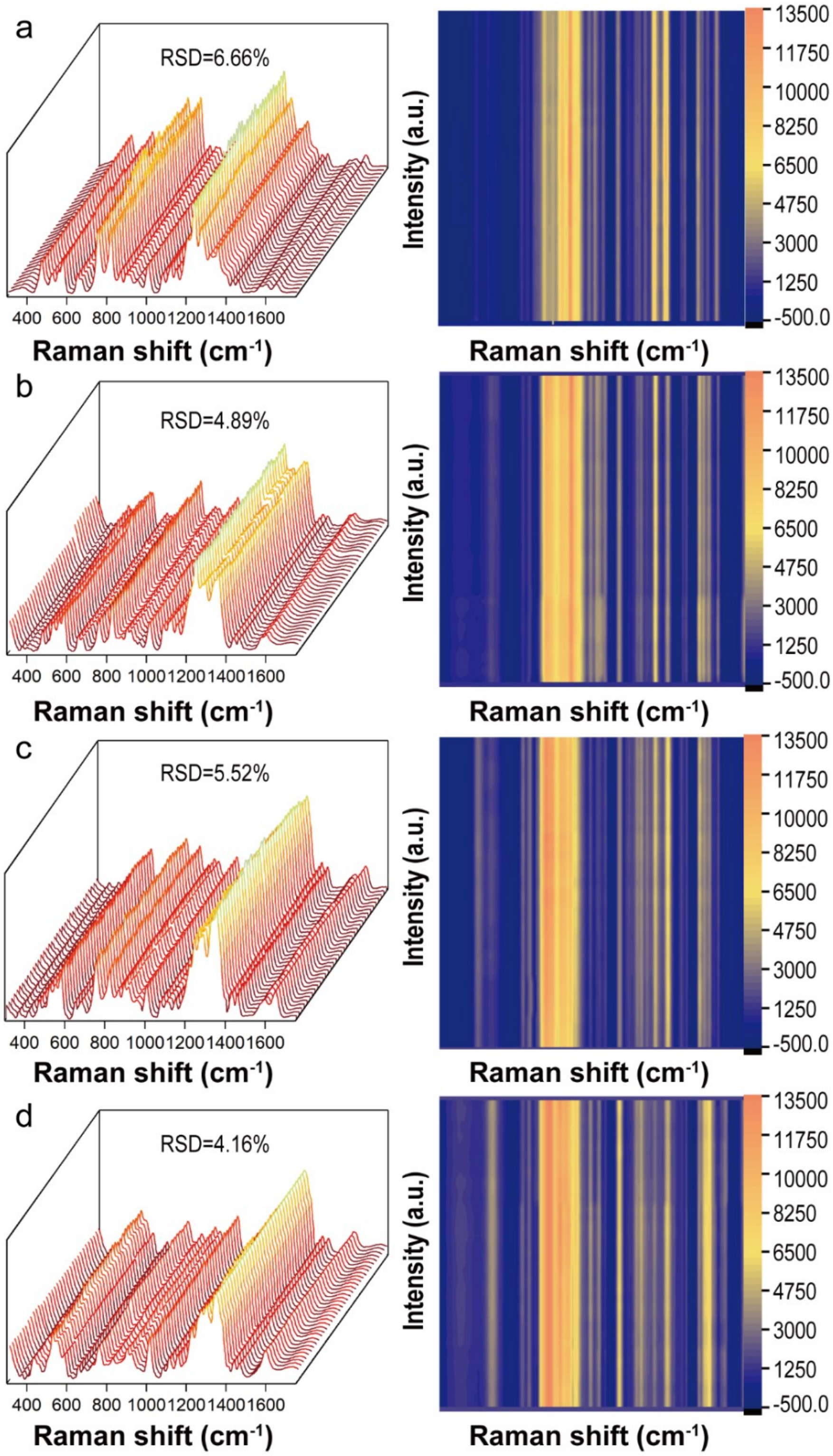

Fig. S10. SERS spectra of (a) BSE, (b) MET, (c) ACE and (d) ESE with a concentration of 10^{-5} M. 5 μL of 10^{-5} M BSE, MET, ACE or ESE simulated urine solution was dropped onto the substrate for each sample. Raman spectra were collected by a portable Raman spectrometer. Exposure time was 1500 ms, and laser wavelength was 785 nm.

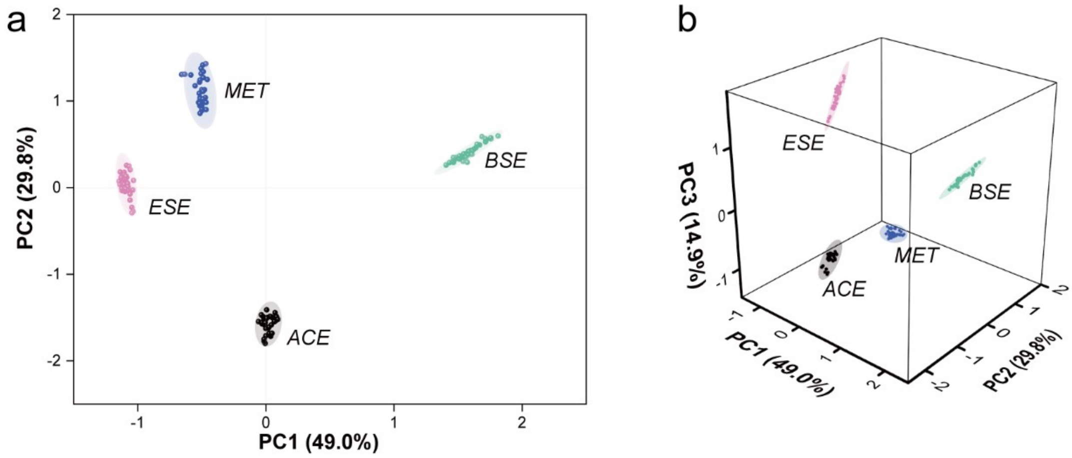

Fig. S11. (a) 2D-PCA and (b) 3D-PCA of four β-blockers simulated urine solution samples are shown as scatter plots. Green dots represent BSE, blue dots represent MET, black dots represent ACE and pink dots represent ESE.