

Supplementary material for

**Selective and Effective Gold Recovery from Printed Circuit Boards
and Gold Slag by Amino Acid Functionalized Cellulose Microspheres**

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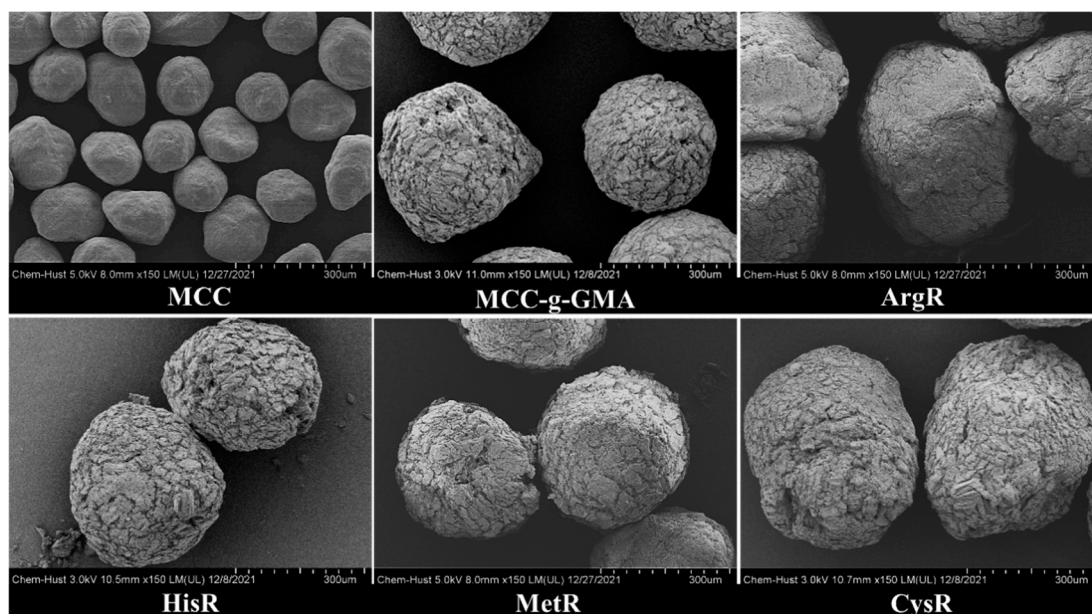


Figure S1 SEM images of MCC, MCC-g-GMA and the amino acid resins

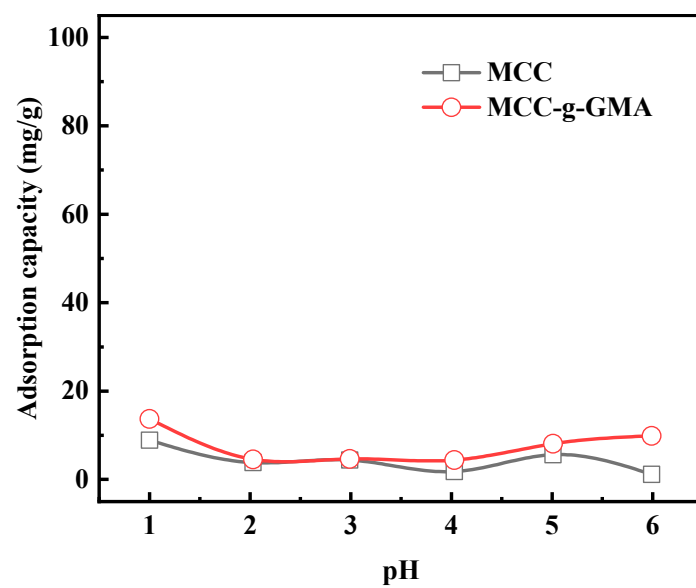


Figure S2 Effect of pH on Au (III) adsorption by MCC and MCC-g-GMA. ($C_0=100$ mg/L, adsorbent mass=10 mg, volume=10 mL, $T=30$ °C).

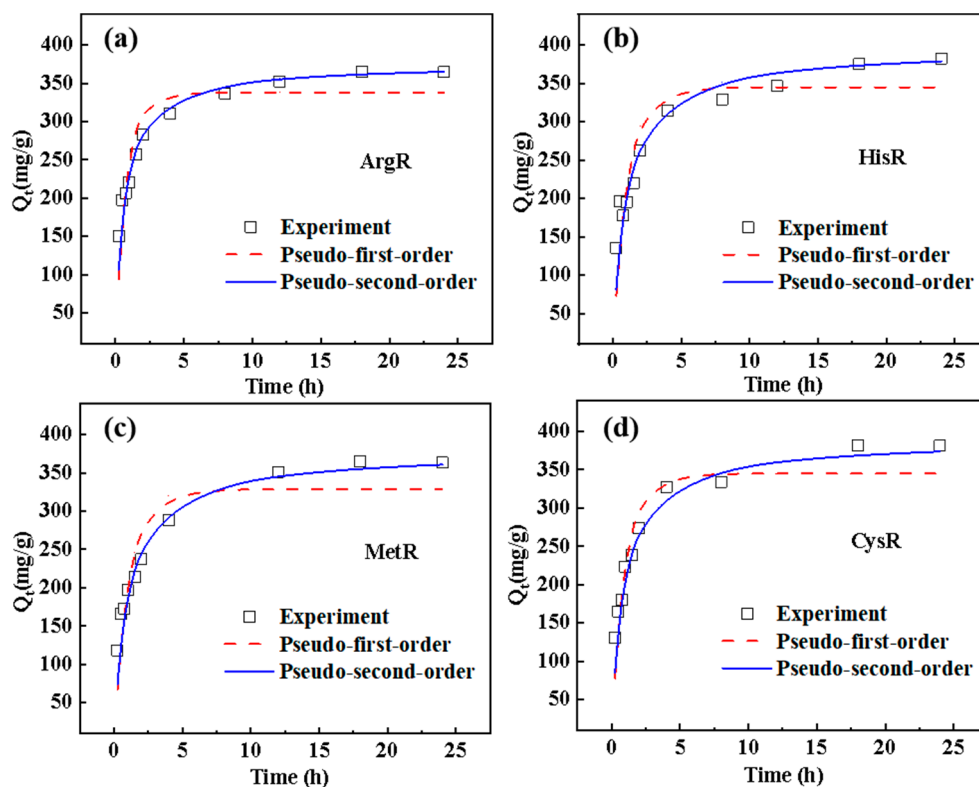


Figure S3 The adsorption kinetics of amino acid resins for Au(III) ions. ($C_0=400$ mg/L, adsorbent mass=10 mg, volume=10 mL, pH=2, $T=30$ °C).

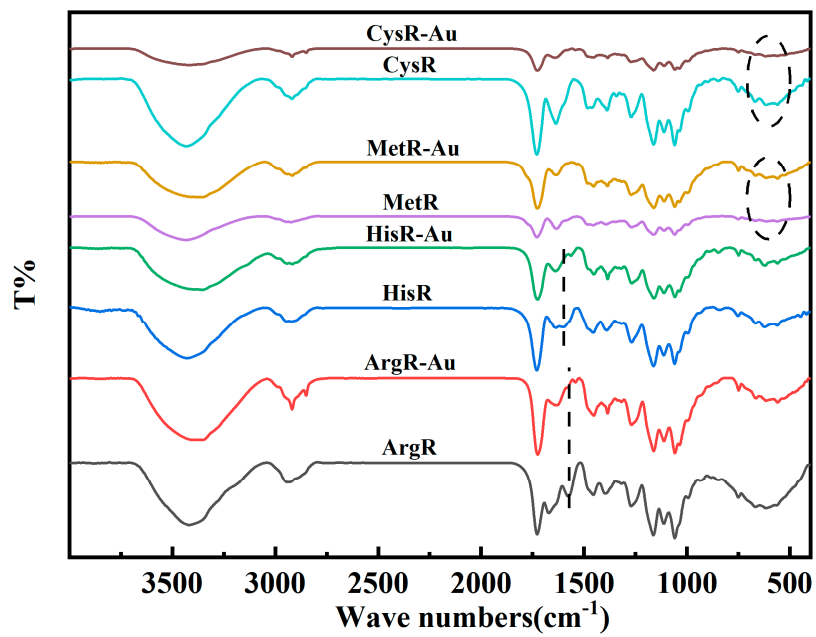


Figure S4 FTIR spectra of ArgR, HisR, MetR and CysR before and after the adsorption of Au(III)

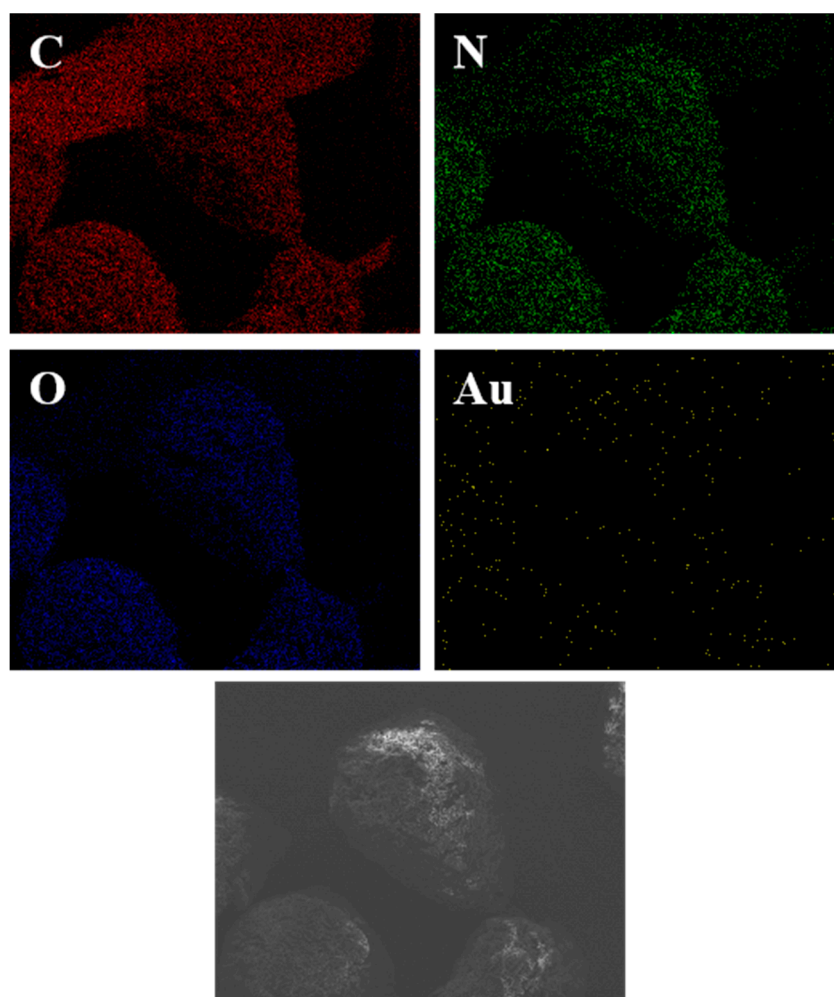


Figure S5 EDX images of ArgR after Au (III) adsorption

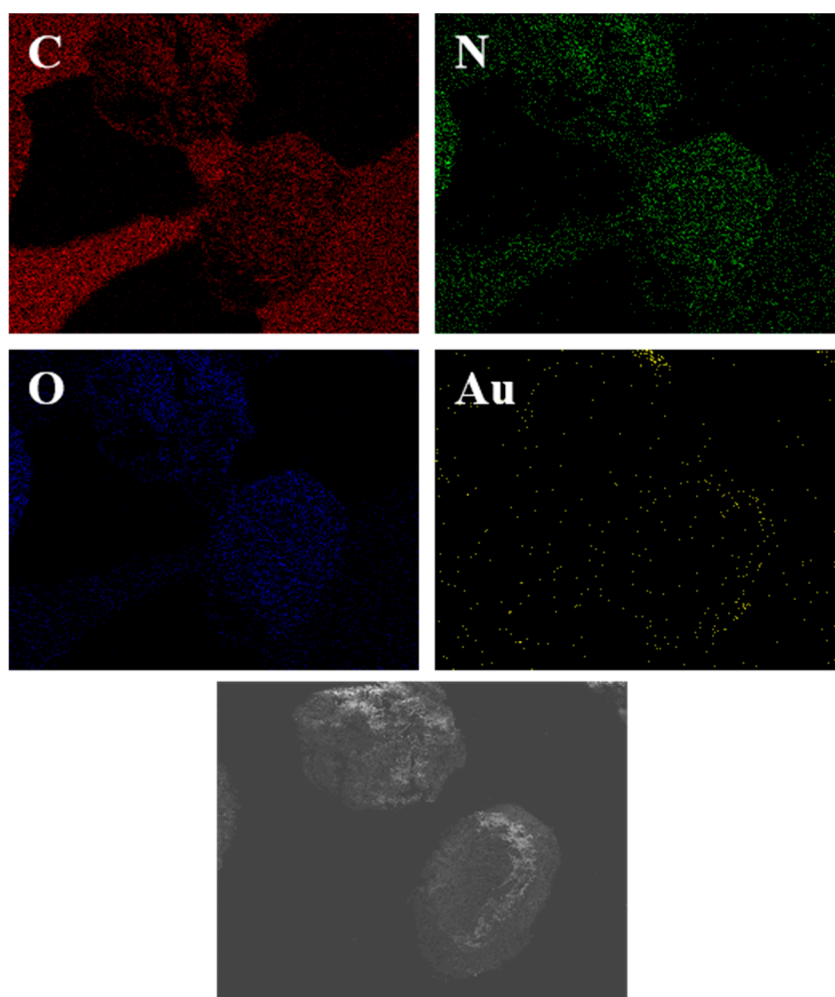


Figure S6 EDX images of HisR after Au (III) adsorption

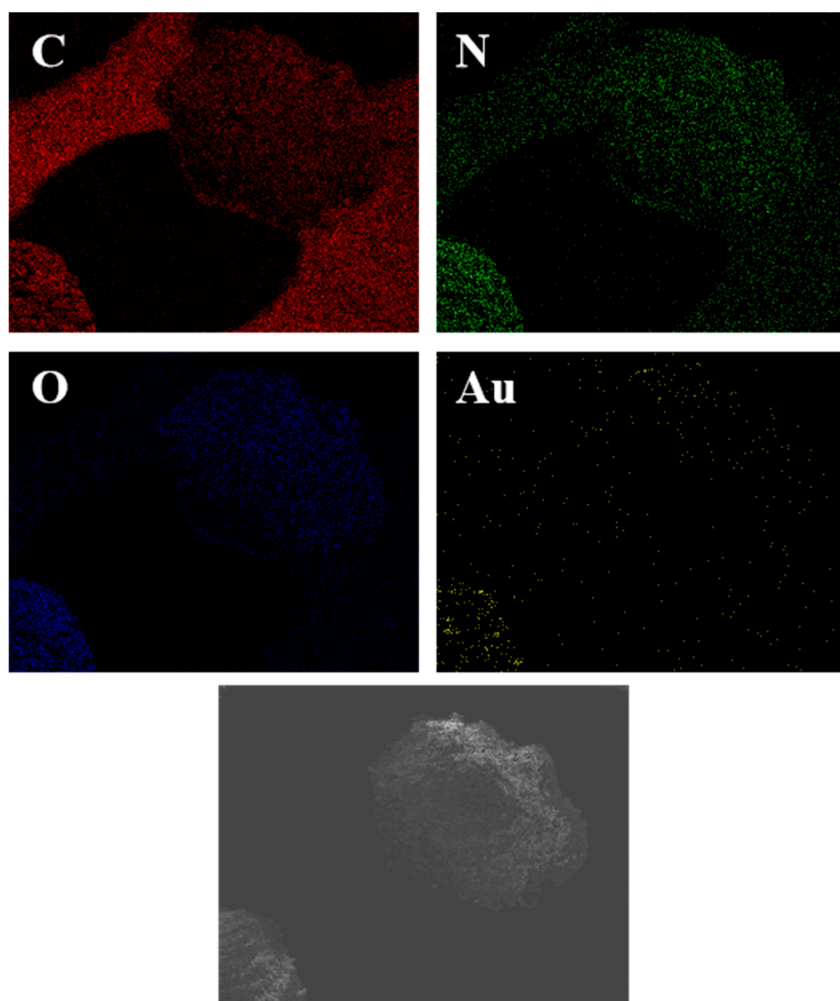


Figure S7 EDX images of MetR after Au (III) adsorption

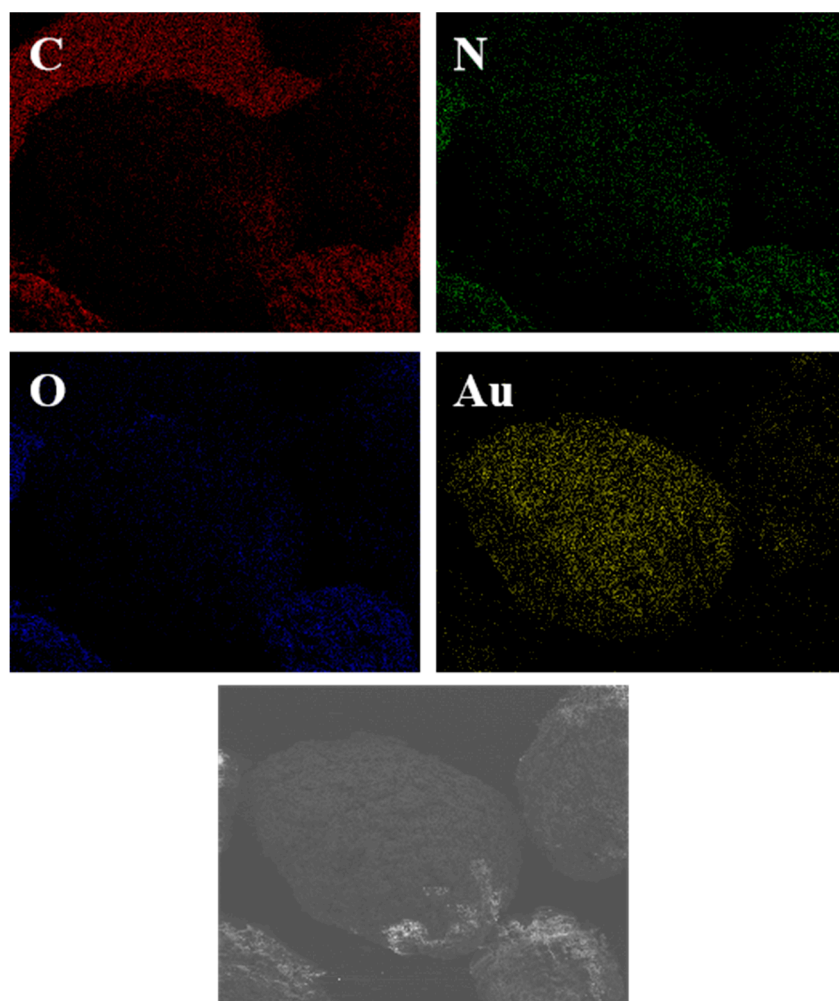


Figure S8 EDX images of CysR after Au (III) adsorption

Table S1 BET surface areas of MCC, MCC-g-GMA and the amino acid resins.

Material	BET surface (m ² /g)
MCC	0.4908
MCC-g-GMA	1.0144
ArgR	1.0482
HisR	1.8206
MetR	1.7532
CysR	1.0548

Table S2 Kinetic parameters and correlation coefficients (R^2) of the amino acid resins. ($C_0=400$ mg/L, adsorbent mass=10 mg, volume=10 mL, pH=2, T=30 °C)

Adsorbent	Pseudo-first-order			Pseudo- second-order		
	$k_1(h^{-1})$	$Q_e(mg/g)$	R^2	$k_2(g/(mg \cdot h))$	$Q_e(mg/g)$	R^2
ArgR	1.2979	337.8255	0.8356	0.0042	374.5318	0.9996
HisR	0.9543	344.8416	0.8083	0.0026	393.7008	0.9976
MetR	0.9187	328.5267	0.8092	0.0026	375.9398	0.9965
CysR	1.0212	345.0596	0.8846	0.0029	387.5969	0.9944