Supporting Information:

Adsorption isotherm study:

The linear equation for Langmuir and Freundlich isotherm models are expressed as follows:

Freundlich isotherm : $\log q_e = \log K_F + (1 / n) \log C_e$ ------- (3)

Langmuir isotherm : $(Ce / q_e) = (1 / Q_o b) + (Ce / Q_o)$ -------- (4)

Where K_F (mg g^{-1}) is the Freundlich constant and 'n' the freundlich exponent. Where q_e (mg g^{-1}) is the adsorbed amount of Hg (II) at equilibrium, C_e (mg L^{-1}) is the equilibrium concentration of Hg (II), Q_o (mg g^{-1}) and b (L mg^{-1}) are Langmuir constants related to adsorption capacity and energy of adsorption. Additional, the important characteristics of the Langmuir isotherm can be explained separation factor R_L, which is calculated by the equation 4.[24]

$R_L = 1/ (1+bQ_o)$ ---------- (5)

The R_L value assumes the nature and the feasibility of adsorption process are specified in Table 1.

Table 1 Nature of adsorption isotherm

R_L value	Adsorption process
$R_L > 1$	Unfavorable
$R_L = 1$	Linear
$0< R_L < 1$	Favorable
$R_L = 0$	Irreversible

Adsorption kinetics study:

The pseudo-first-order kinetic model can be expressed as:[31]

$$\textbf{Log } (q_e - q_t) = \log q_e - [k_1 / 2.303]\, t \text{ -------------- } (6)$$

Where k_1 is the pseudo-first-order rate constant (min^{-1}) and qe ($mg\ g^{-1}$) is the adsorption capacity at equilibrium and qt ($mg\ g^{-1}$) is the adsorbed amount of metal ion after time t (min).

The pseudo-second-order kinetic model can be expressed as:[32]

$$t / q_t = 1/ k_2 q_e^2 + t/q_e \text{ -------------- } (7)$$

Where k_2 is the pseudo-second-order rate constant (g mg^{-1} min^{-1}).

Intra-Particle diffusion model:

The equation for intra-Particle diffusion model can be expressed as

$$q_t = k_{id} t^{1/2} + C \text{ -------------- } (8)$$

Where, q_t is the adsorption capacity at any time t and k_{id} is the intra particle diffusion rate constant and C is the film thickness.