Table 1: The nonlinear forms of PFO, PSO, and PNO equations.

Kinetic Models	Nonlinear equations	Parameters
Pseudo-First Order (PFO)	$Q_t = Q_e(1 - e^{-K_1 t})$	Q_e (mg/g) and Q_t (mg/g) refer to the quantity of dye adsorbed at equilibrium and at time t (mn), respectively. k_1 (mn^{-1}) is the equilibrium rate constant of the first order.
Pseudo-Second Order (PSO)	$Q_t = \left(\frac{K_2 {Q_e}^2 t}{K_2 Q_e t + 1}\right)$	K_2 (kg g^{-1} mn^{-1}) is the equilibrium rate constant of the second order.
Pseudo n^{th} Order ($Pn^{th}O$)	$= Q_e(1 - \frac{Q_t}{\frac{1}{\left[1 + (n-1)K_n t {Q_e}^{(n-1)}\right]^{\frac{1}{n-1}}}})$	K_n is the rate constant (kg^{n-1} g^{1-n} mn^{-1}) of the third order.

Table 2: Lattice parameters, grain seizes, microconstraints and dislocation densities of $SrTiO_3/rGO_x$ (x = 0, 5, 10, 15 and 20%) and $SrTiO_3/rGO_{20}@Ag_x$ (x = 2 and 4%)

	$SrTiO_3/rGO_x$	0%	5%	10%	15%	20%	@Ag 2%	@Ag 4%
a (Å)	experimental	3,9073	3,9074	3,9071	3,9065	3,9061	3,9070	3,9081
	theoretical GGA	3,9053						
	D (Å)	214,07	199,21	191,93	185,20	178,24	189,93	199,25
	ξ %.10^{-2}	0,285	0,303	0,431	0,554	0,543	0,671	0,701
	δ $(nm)^{-2}$.10^{-3}	2,182	2,520	2,715	2,915	3,148	2,772	2,519

Table3: Indirect and direct band gap energies and Urbach energy of $SrTiO_3/rGO_x$ (x = 0, 10 and 20%) and and $SrTiO_3/rGO_{20}@Ag_x$ (x = 2 and 4%) nanocomposites.

$SrTiO_3/rGO_x$	x = 0%		x = 10%	x = 20%	Ag 2%	Ag 4%
	Exp	GGA+U				
Indirect band gap energy (eV)	3,21	2.98	3,05	2,93	2,88	2,82
Urbach energy (meV)	89		198	304	326	359

Table4 : Modeling results of adsorption kinetics of BM on $SrTiO_3/rGO_x$(x=0, 5, 10, 15 and 20%).

$SrTiO_3$ /rGO_x	Q_{e}experimental (mg/g)	Model									
		PFO			PSO			$Pn^{th}O$			
		K_1 (mn^{-1})	Q_e (mg/g)	R^2	K_2 (mn^{-1})	Q_e (mg/g)	R^2	K_n (mn^{-1})	Q_e (mg/g)	n	R^2
0	5.15	0.059	5.22	0.979	0.010	6.34	0.979	0.040	5.43	0.702	0.985
5	6.67	0.115	6.37	0.950	0.023	7.14	0.985	0.026	7.10	0.318	0.996
10	8.53	0.146	8.27	0.983	0.024	9.14	0.995	0.069	8.54	0.461	0.994
15	11.69	0.068	11.53	0.984	0.006	13.73	0.992	0.040	12.12	0.625	0.995
20	12.57	0.143	11.94	0.951	0.017	13.20	0.987	0.030	13.11	0.282	0.997