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Kinetics, isotherm and mechanism studies of organic dyes adsorption on poly (4, 4'-oxybisbenzenamine) and copolymer of poly (4, 4'-oxybisbenzenamine-pyrrole) macro-nanoparticles synthesized by multifunctional carbon dot

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Supporting Information

Table 1: Peak identification in the IR absorption frequency region of POBBA and COP (before and after their adsorption with a dye) and the corresponding functional groups

POBBA	Major functional groups	COP	Major functional groups
Absorption frequency regions (cm^{-1})		**Absorption frequency regions (cm^{-1})**	
3424 2878 1498 1327 1246	N-H (stretching vibration) C-H (stretching vibration) C=C (stretching vibration) C-N (stretching vibration) C-O ether (stretching vibration)	3351 3074 1605 and 1501 1340 1246	N-H (stretching vibration) C=C-H (aromatic stretching vibration) C=C (stretching vibration) C-N (stretching vibration) C-O ether (stretching vibration)

Adsorption kinetics $$\ln\left(q_e - q_t\right) = \ln\left(q_e\right) - k_1 t \quad (3)$$

$$\frac{t}{q_t} = \frac{1}{k_2 q_e^2} + \frac{t}{q_e} \quad (4)$$

Where q_t and q_e (mg/g) represent the amount of the organic dye (adsorbed at equilibrium) and k_1 (min^{-1}) is the rate constant of the pseudo-first-order model and k_2 (g mg^{-1} min^{-1}) is the pseudo-second-order model rate constant.

Intraparticle diffusion

Herein, if the intraparticle diffusion is the rate controlling factor, the uptake of the adsorbate varies with the square root of the adsorption time as follows:

$$q_t = k_i t^{1/2} + C \quad (5)$$

The adsorption steps are relevant with the intercept, which represents the intercept of *C* (mg/g) and k_i (mg g^{-1} $min^{-1/2}$) is the diffusion rate constant

Langmuir and Freundlich adsorption isotherms

$$\frac{C_e}{q_e} = \frac{1}{q_0 K_L} + \frac{1}{q_0 C_e} \quad (6)$$

$$lnq_e = lnK_F + \frac{1}{nC_e} \quad (7)$$

The SEM micrographs of POBBA and COP after the adsorption of the organic dyes

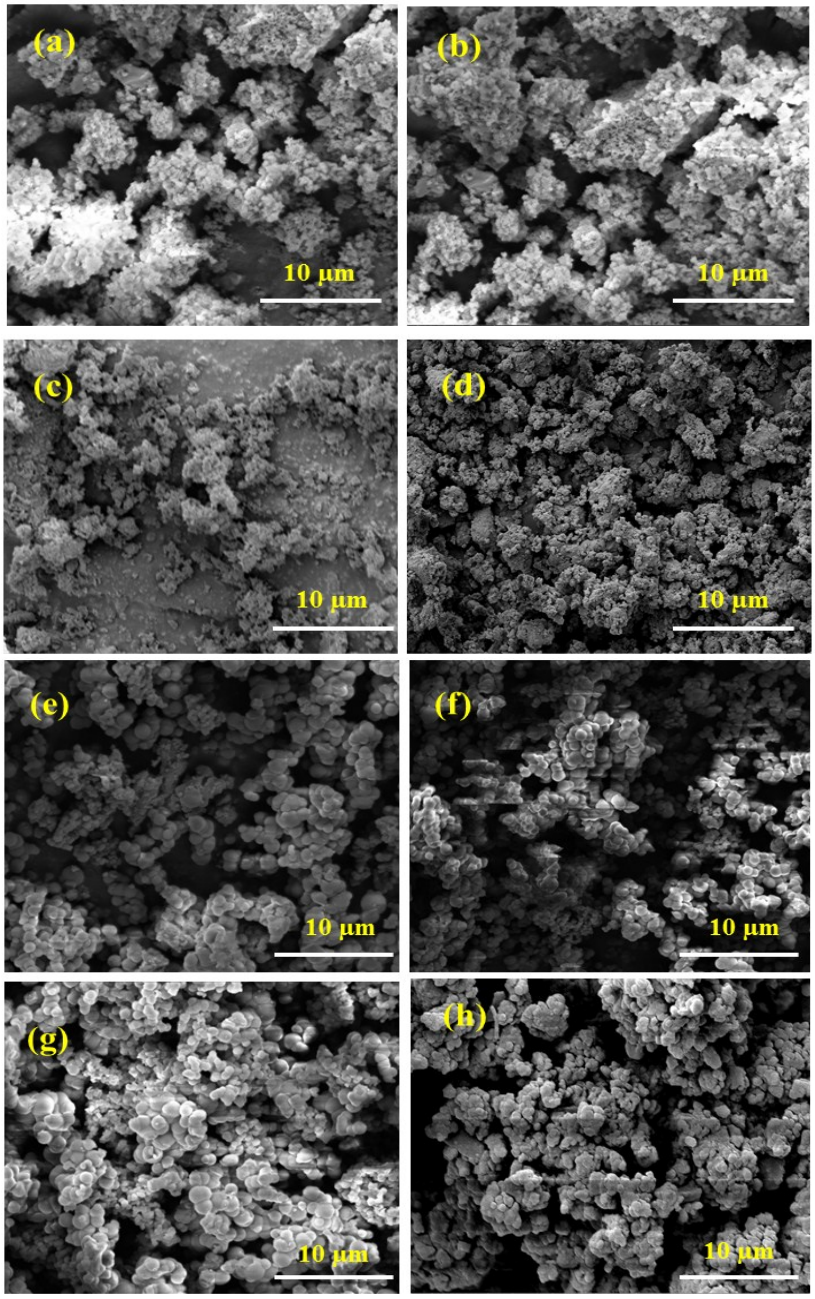

Figure 1. (a,b,c and d) are the SEM images of POBBA after the adsorption of C.R, C.V, M.B, and R.B and (e, f, g and h) are SEM images of COP after the adsorption of C.R, C.V, M.B and R.B.