A Sustainable Approach for the Adsorption of Methylene Blue from Aqueous Background: Adsorbent Based On DES/CGS Modified GO@ZrO_2

Vishwajit Chavda[a], Brijesh Patel[a], Sneha Singh[a], Darshna Hirpara[a], V. Devi Rajeswari[b], and Sanjeev Kumar[a*]

[a]Applied Chemistry Department, Faculty of Technology & Engineering, The Maharaja Sayajirao University of Baroda, Vadodara – 390 002, India.

[b]Department of Biomedical Sciences, School of Biosciences and Technology, VIT University, Vellore – 14, Tamil Nadu, India

---

Supporting Information

Table of Contents

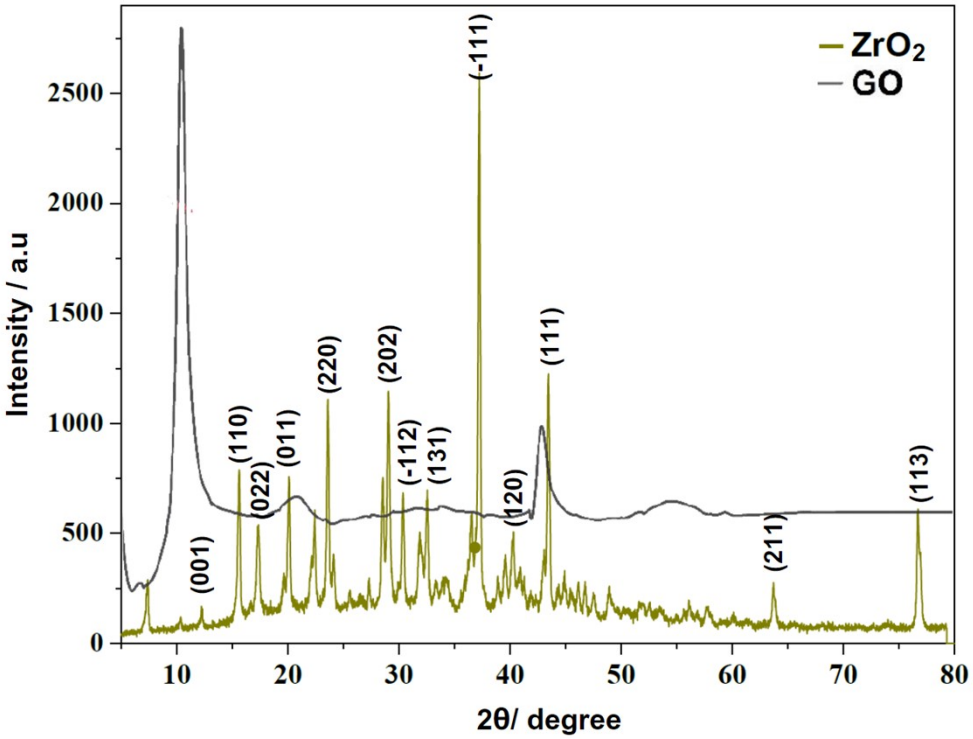

Fig S1: XRD of pure GO and ZrO_2.

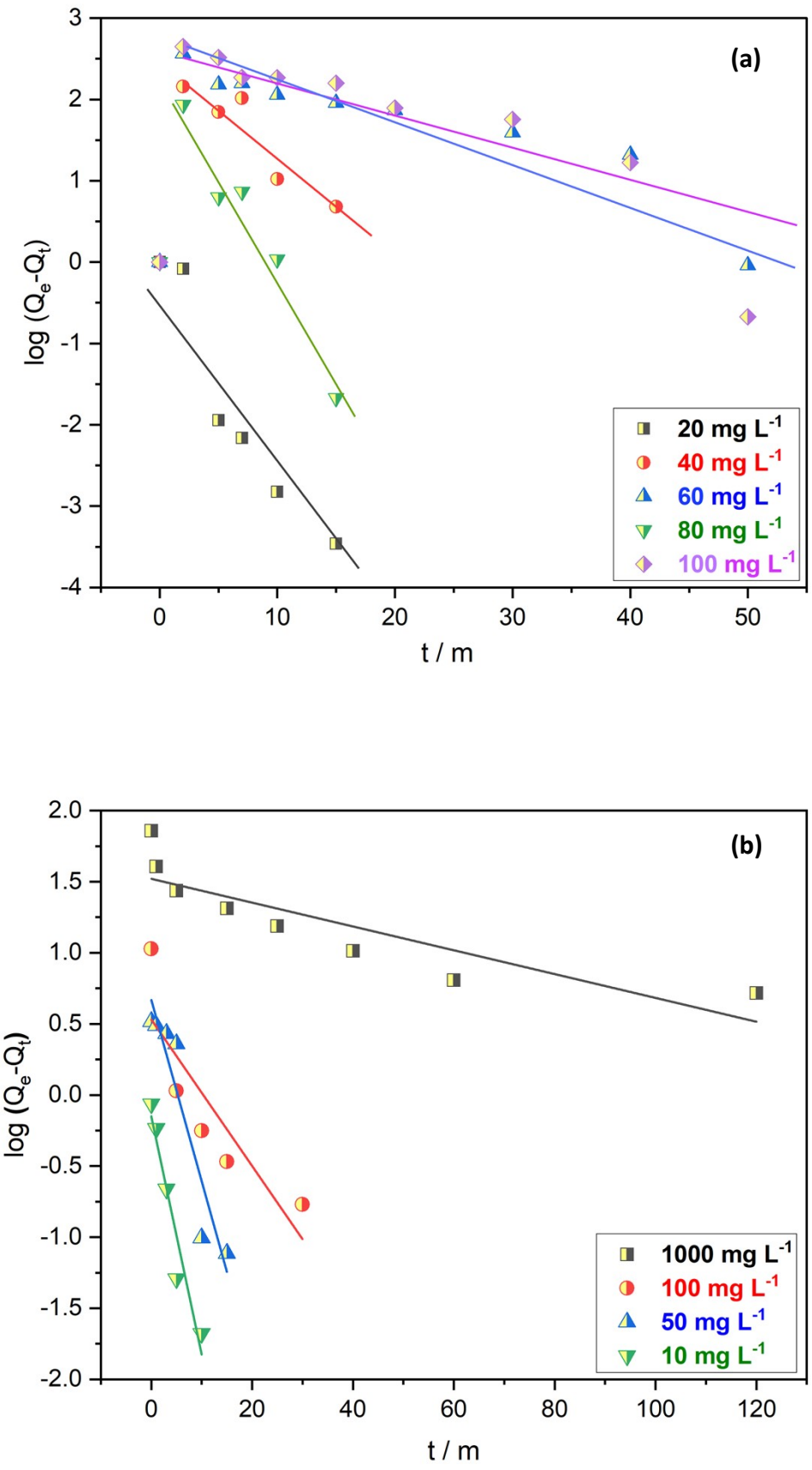

Fig S2: Variation of log (Q_e-Q_t) vs t and fitted data of Pseudo-first order kinetic model: a) DES-GO@ZrO_2 (2 mg/ml dosage, 20 ml solution of MB), and b) CGS-GO@ZrO_2 (10 mg/ml dosage, 20 ml solution of MB) at 30±0.1°C.

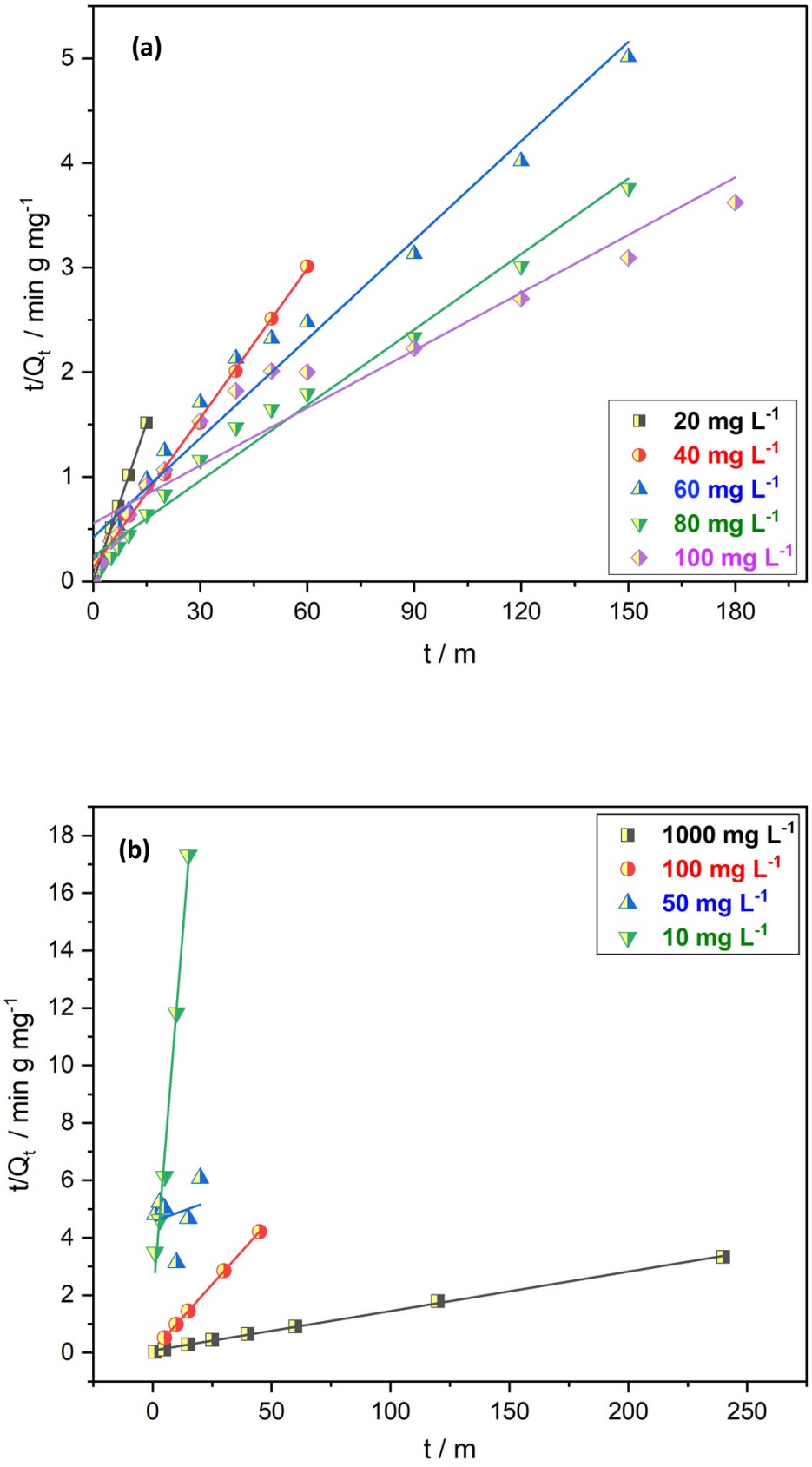

Fig S3: Variation of t/Q_t vs t and fitted data of Pseudo-second order kinetic model: a) DES-GO@ZrO_2 (2 mg/ml dosage, 20 ml solution of MB), and b) CGS-GO@ZrO_2 (10 mg/ml dosage, 20 ml solution of MB) at 30±0.1°C.

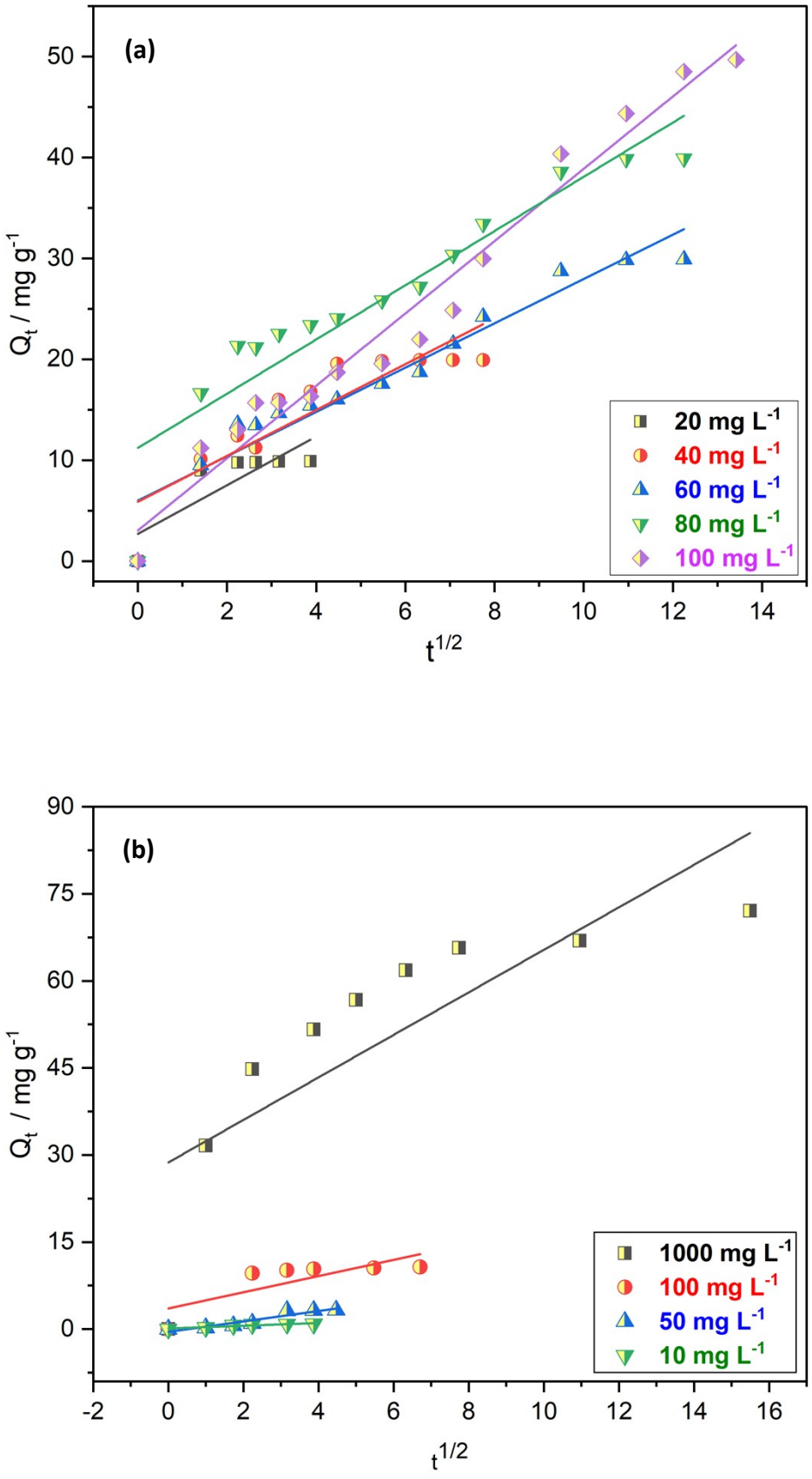

Fig S4: Variation of Q_t vs $t^{1/2}$ and fitted data of Intraparticle diffusion kinetic model: a) DES-GO@ZrO_2 (2 mg/ml dosage, 20 ml solution of MB), and b) CGS-GO@ZrO_2 (10 mg/ml dosage, 20 ml solution of MB) at 30±0.1°C.

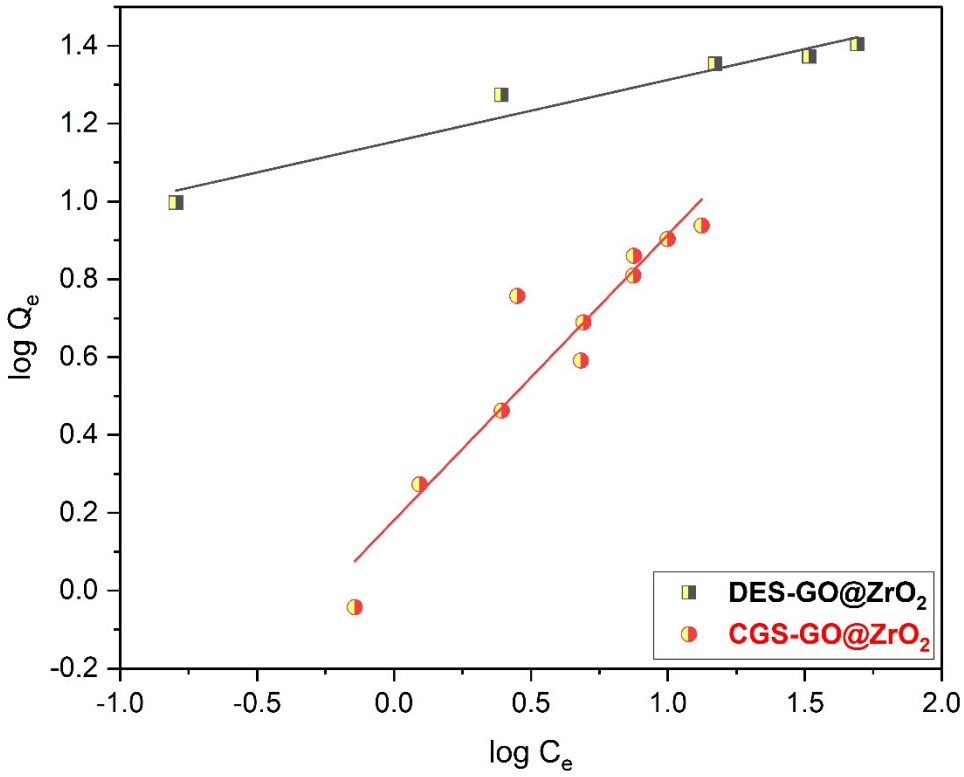

Fig S5: Variation of log Q_e vs log C_e and fitted Freundlich isotherm model for DES-GO@ZrO_2 (2 mg/ml dosage, 20 ml solution of MB), and CGS-GO@ZrO_2 (10 mg/ml dosage, 20 ml solution of MB) at 30±0.1°C.

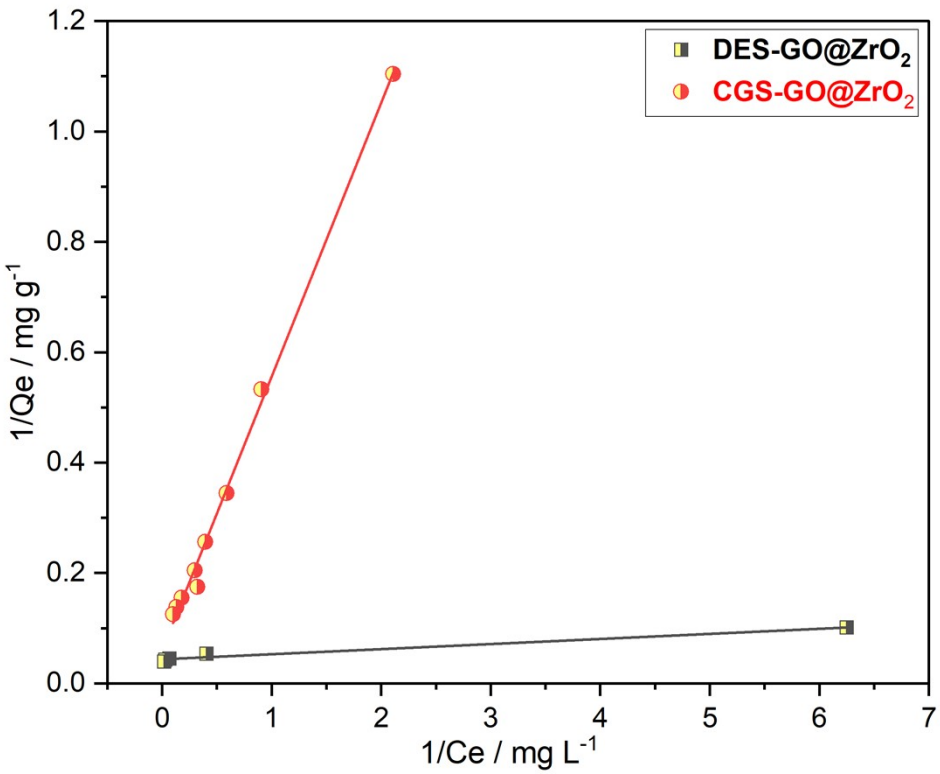

Fig S6: Variation of $1/Q_e$ vs $1/C_e$ and fitted Langmuir isotherm model for DES-GO@ZrO_2 (2 mg/ml dosage, 20 ml solution of MB), and CGS-GO@ZrO_2 (10 mg/ml dosage, 20 ml solution of MB) at 30±0.1°C.

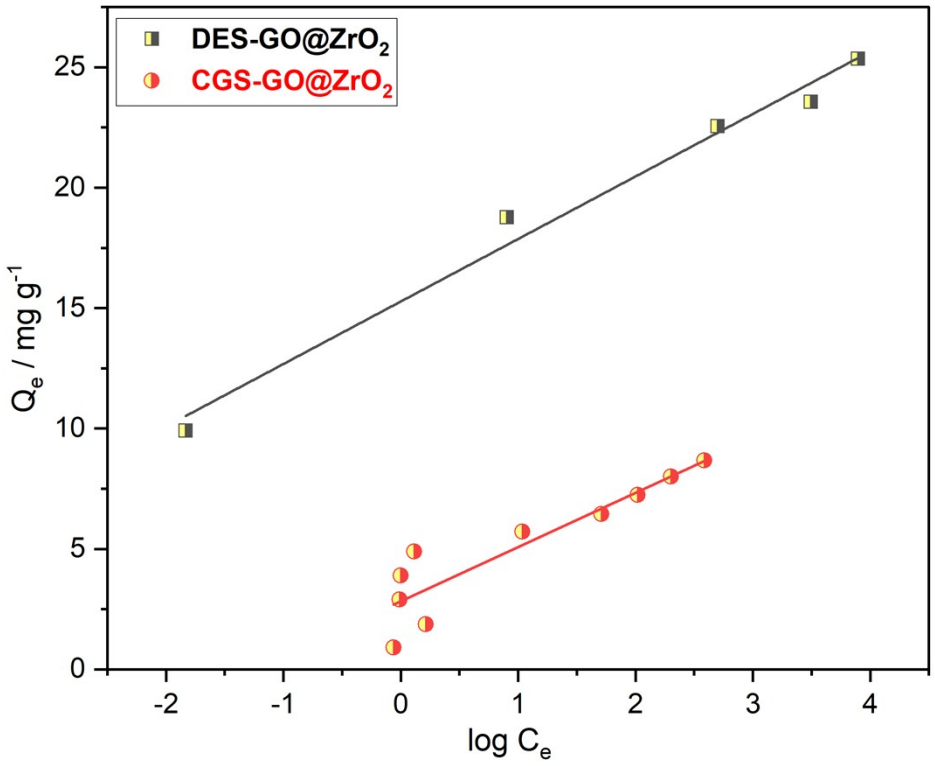

Fig S7: Variation of Q_e vs log C_e and fitted Temkin isotherm model for DES-GO@ZrO_2 (2 mg/ml dosage, 20 ml solution of MB), and CGS-GO@ZrO_2 (10 mg/ml dosage, 20 ml solution of MB) at 30±0.1°C.

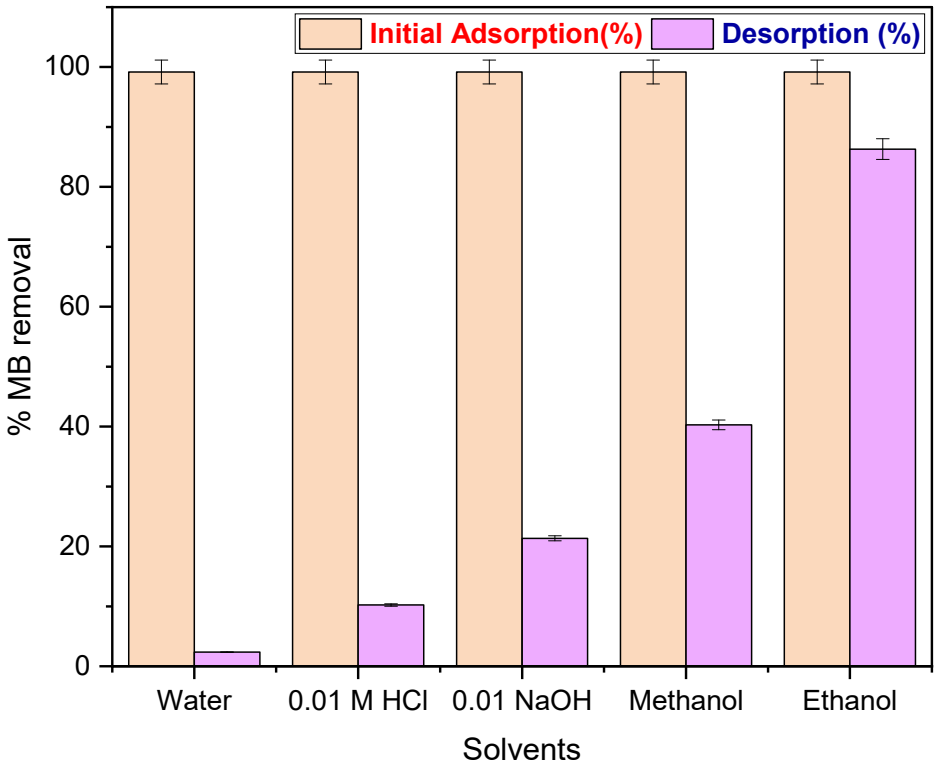

Fig S8: Desorption study of MB from DES-GO@ZrO_2 using 50 ml of various solvents.

Table S1: EDX elemental data of modified GO@ZrO_2 with CGS and DES.

Elements	GO@ZrO2		CGS-GO@ZrO2		DES-GO@ZrO2	
	Weight %	**Atomic %**	**Weight %**	**Atomic %**	**Weight %**	**Atomic %**
C	42.43	60.75	50.76	69.58	52.48	68.22
O	30.22	33.94	25.58	25.75	23.52	26.30
Zr	27.35	5.31	23.66	4.67	22.75	4.48
N	-	-	-	-	0.96	0.58
Cl	-	-	-	-	0.29	0.42