*Supporting information for*

# Enhanced Adsorptive Removal of Hazardous Anionic Dye "Congo Red" by Ni/Cu Mixed-Component Metal-Organic Porous Material

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**Table SI.1** Structural properties of Cu-BTC and Ni/Cu-BTC.

| Samples | $S_{BET}$ ($m^2/g$) | $S_{Langmuir}$ ($m^2/g$) | $V_{total}$ ($cm^3/g$) |
|---|---|---|---|
| Cu-BTC | 1379 | 1817 | 0.56 |
| Ni30/Cu-BTC | 1156 | 1261 | 0.52 |
| Ni50/Cu-BTC | 1062 | 1172 | 0.48 |
| Ni80/Cu-BTC | 1047 | 1128 | 0.45 |

**Table SI.2** Constants and correlation coefficients of Langmuir, Freundlich and Temkin models.

| Adsorbent | Langmuir | | | Freundlich | | | Temkin | | |
|---|---|---|---|---|---|---|---|---|---|
| | $q_L$ (mg/g) | $K_L$ (L/mg) | $R^2$ | $K_f$ (L/g) | *1/n* | $R^2$ | $b_T$ (kJ/mol) | $K_T$ (L/mg) | $R^2$ |
| Cu-BTC | 1027 | 0.0169 | 0.999 | 175.4 | 0.275 | 0.958 | 0.0139 | 0.2739 | 0.979 |
| Ni30/Cu-BTC | 1183 | 0.0144 | 0.999 | 183.2 | 0.288 | 0.982 | 0.0117 | 0.2055 | 0.992 |
| Ni50/Cu-BTC | 1226 | 0.0188 | 0.998 | 210.9 | 0.280 | 0.963 | 0.0114 | 0.2756 | 0.977 |
| Ni80/Cu-BTC | 870 | 0.0088 | 0.996 | 88.9 | 0.339 | 0.981 | 0.0142 | 0.0892 | 0.988 |

**Table SI.3** Comparison of the maximum uptake capacities of CR dye on various adsorbents.

| Dye | Adsorbent | Maximum uptake capacities (mg/g) | Reference |
|---|---|---|---|
| CR | Cu-BTC | 959.90 | this work |
| | Ni50/Cu-BTC | 1078 | this work |
| | Glu–$Cu^{2+}$ (MOFs) | 77.60 | (35) |
| | $MFe_2O_4$ | 170 | (36) |
| | Maghemite nanoparticles | 208.33 | (37) |
| | Commercial activated carbon | 493.80 | (38) |
| | Carbon slurry waste | 272 | (39) |
| | Silk cotton carbon | 250 | (40) |
| | White ash | 171 | (41) |
| | Pellet adsorbent | 31.70 | (41) |
| | Anilinepropylsilica xerogel | 22.62 | (42) |

**Table SI.4** Kinetic parameters for CR adsorption on Cu-BTC and Ni/Cu/Cu-BTC.

| Sample | Pseudo-first-order rate equation | | | | | | Pseudo-second-order rate equation | | | | | | Intra-particle diffusion model | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $q_{e,exp}$ (mg/g) | $q_{e,cal}$ (mg/g) | $K_1$ (1/min) | $R^2$ | $\Delta q$ (mg/g) | $\Delta q$ (%) | $q_{e,exp}$ (mg/g) | $q_{e,cal}$ (mg/g) | $K_2$ (g/mg min) | $R^2$ | $\Delta q$ (mg/g) | $\Delta q$ (%) | $q_{e,exp}$ (mg/g) | $C$ (mg/g) | $K_3$ (mg/g $min^{1/2}$) | $R^2$ |
| Cu-BTC | 911 | 728.2 | 0.0079 | 0.984 | 182.9 | 20.07 | 911 | 1023 | 0.0139 | 0.997 | -112 | -12.28 | 911.1 | 515.9 | 40.15 | 0.967 |
| Ni30/Cu-BTC | 1013 | 802.1 | 0.0073 | 0.986 | 210.9 | 20.82 | 1013 | 1120 | 0.0137 | 0.997 | -107 | -10.56 | 1013 | 163.5 | 43.79 | 0.974 |
| Ni50/Cu-BTC | 1078 | 843.0 | 0.0087 | 0.985 | 235.0 | 21.79 | 1078 | 1211 | 0.0156 | 0.998 | -133 | -12.34 | 1078 | 217.2 | 46.70 | 0.962 |
| Ni80/Cu-BTC | 680 | 560.8 | 0.0118 | 0.969 | 119.0 | 17.51 | 680 | 980.3 | 0.0186 | 0.993 | -301 | -44.20 | 679.8 | 151.9 | 40.15 | 0.967 |

**Table SI. 5** Thermodynamics adsorption parameters for CR on Cu-BTC and Ni50/Cu-BTC samples.

| Adsorbents | ΔH kJ/mol | ΔS J/mol K | ΔG (kJ/mol) | | | $R^2$ |
|---|---|---|---|---|---|---|
| | | | 303 K | 313 K | 323 K | |
| Cu-BTC | 8.83 | 87.67 | -17.70 | -18.60 | -19.50 | 0.998 |
| Ni50/Cu-BTC | 22.30 | 132.70 | -17.90 | -19.20 | -20.50 | 0.999 |