

Supplementary Information

Metal-free high-adsorption-capacity adsorbent derived from spent coffee grounds for methylene blue

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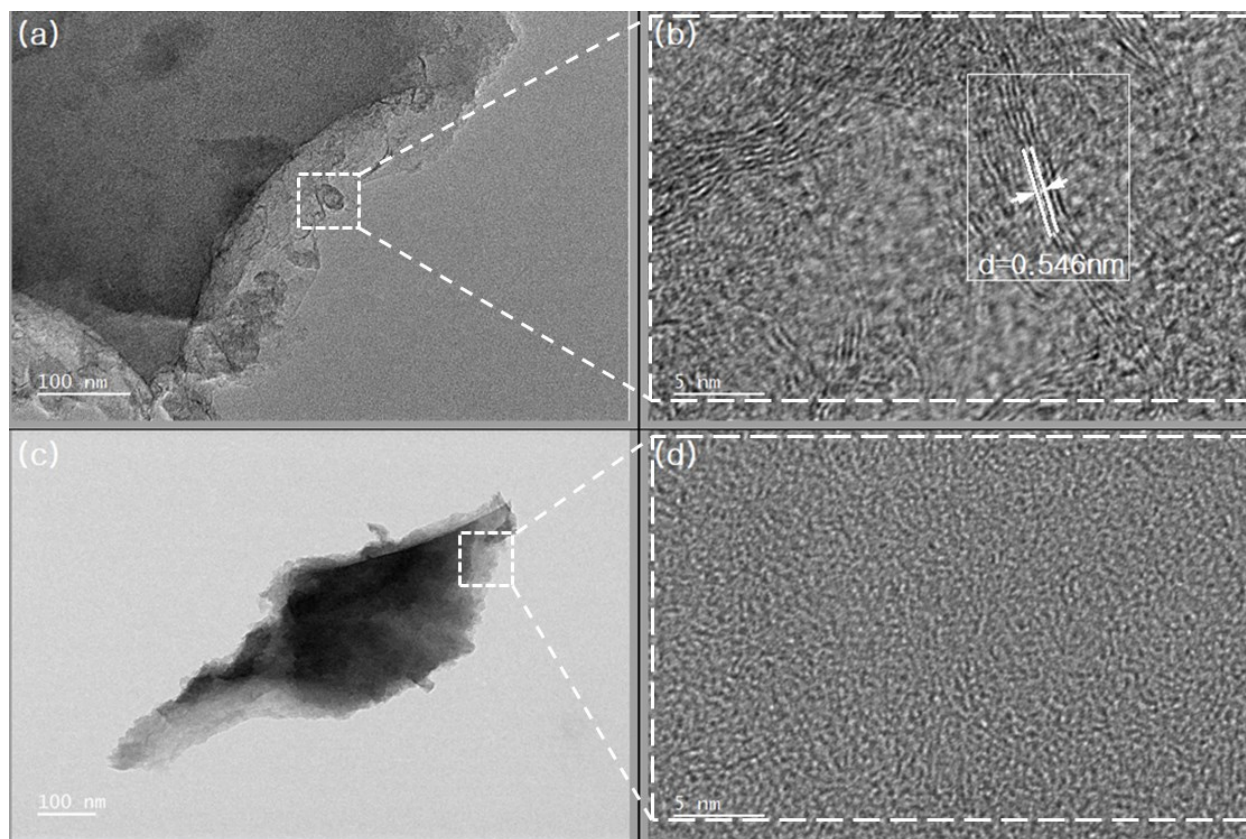


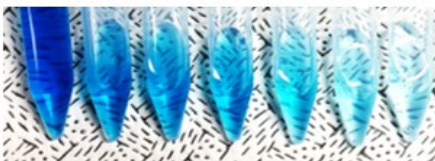
Fig. S1. TEM images of (a, b) SCG-KU, the combined urea and KOH activation product of spent coffee grounds and (c, d) SCG-K, the product of the activation of spent coffee grounds by KOH.

Contact time : 0 20 40 60 100 140 160 min.

SCG-Na



SCG-NaU



SCG-K



SCG-KU



Fig. S2. Photographs of MB solutions acquired at specific contact times after the addition of MB adsorbents SCG-Na, SCG-NaU, SCG-K and SCG-KU, from left to right: 20 min, 40 min, 60 min, 80 min, 120 min, 140 min, and 180 min (initial MB concentration: 200 mg/L, adsorbent dosage: 300 mg/L).

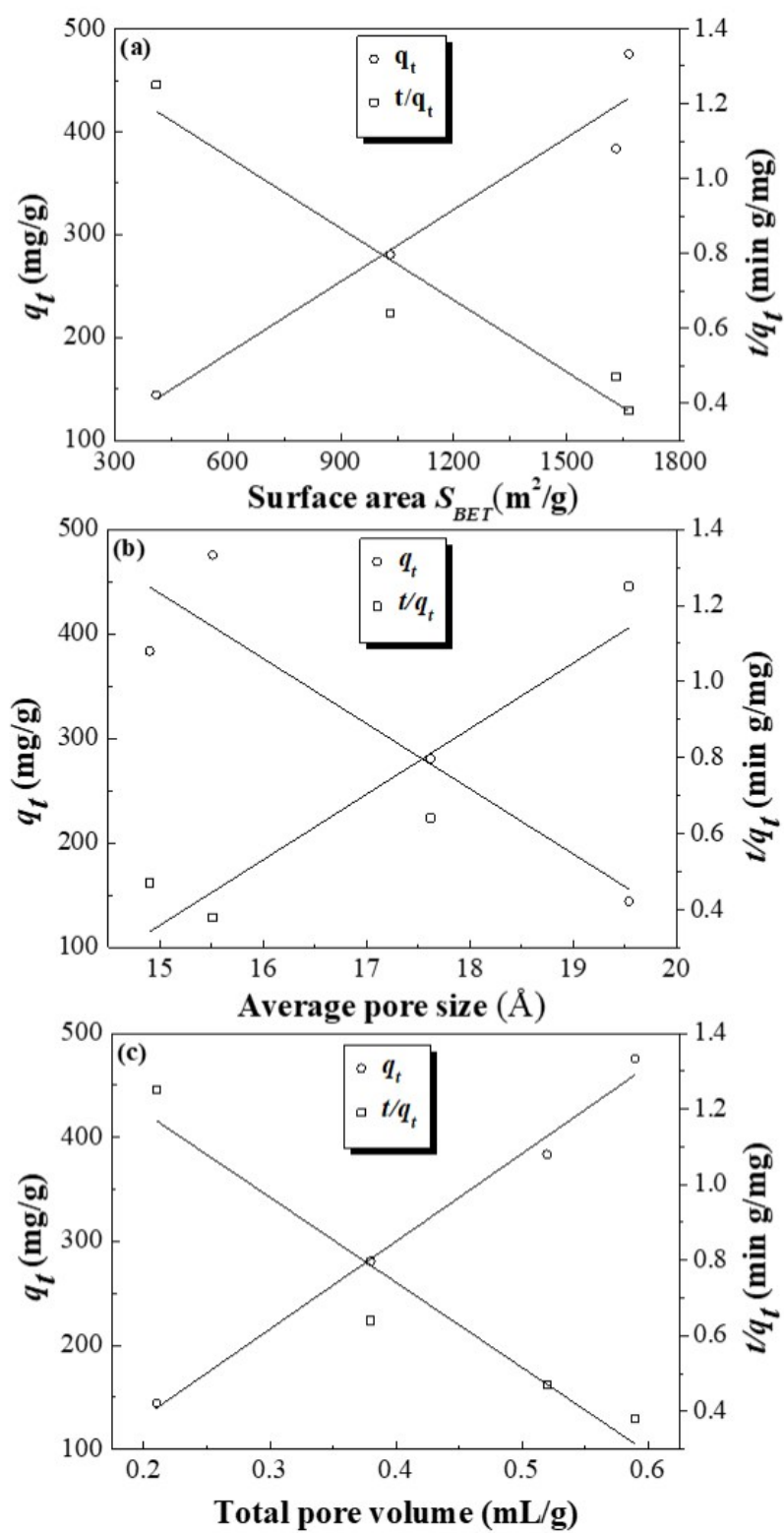


Fig. S3. Relationships between adsorption capacity of carbon materials and (a) surface area, (b) average pore size, and (c) total pore volume.

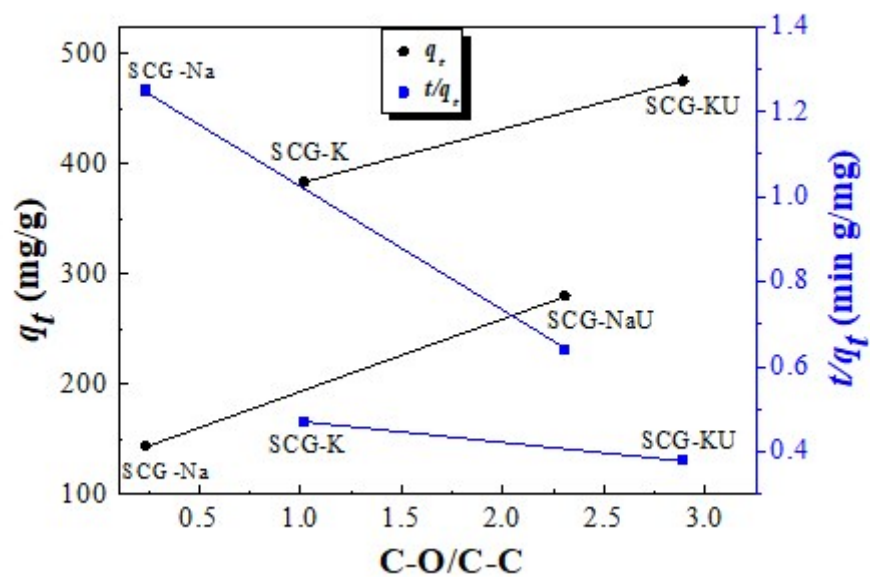


Fig. S4. Effect of C–O content on the adsorption capacity of carbon materials.

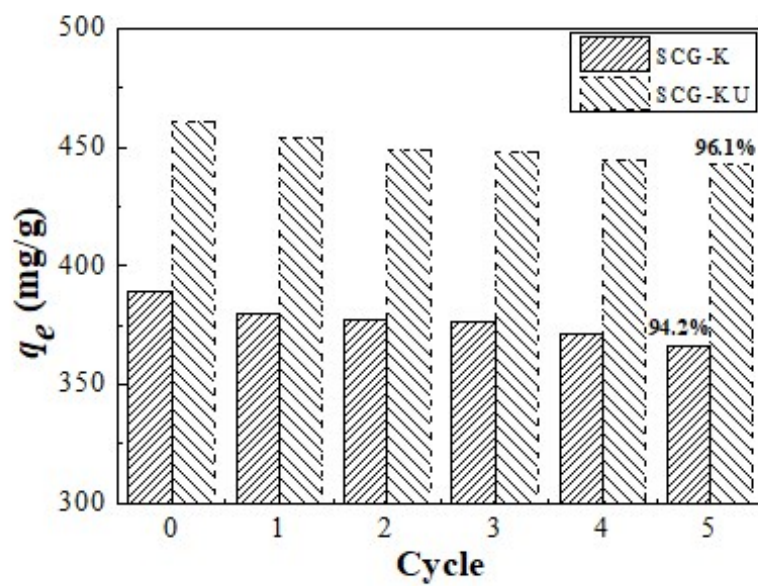


Fig. S5. Recovery performance of SCG-K and SCG-KU for MB adsorption.