Electronic Supplementary Material (ESI) for New Journal of Chemistry.
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Figure S1 and S2 demonstrate the TEM and SEM morphology of the mesoporous carbon carriers CMK-3. The TEM images reveal slight structural differences between the samples, while all exhibit pore structures resembling fingerprints that run throughout the sample's interior. These findings showcase the integrity and continuity of CMK-3's porous structure. The formation of pores was limited at low temperatures, while at high temperatures, carbon deposition was amplified, leading to pore breakage and blockage. From the SEM images, it is evident that CMK-3 exhibits a uniform morphology of short rods and bundles after high-temperature carbonization. However, at temperatures above 800 °C, the carbon carrier bundles break, leading to their disordered appearance. The surfaces of the carbon carrier become roughened and wrinkled.

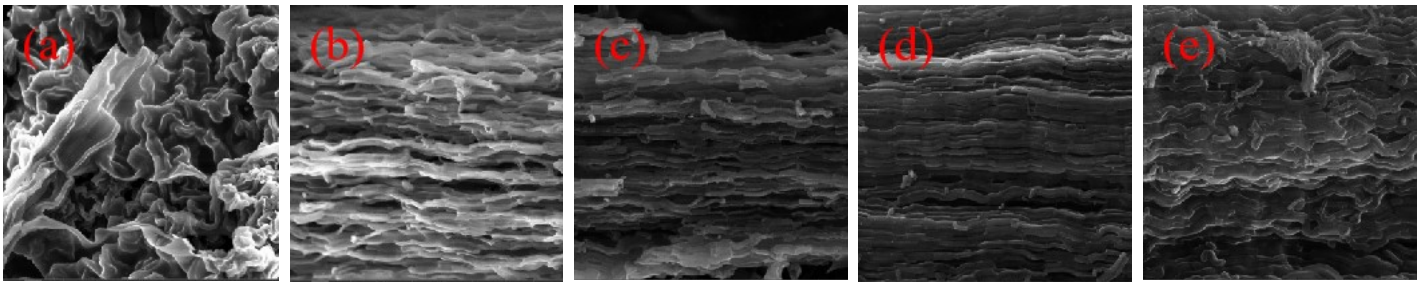

Figure S1. SEM morphology of CMK-3 at different temperatures. (a) 500-CMK;(b) 600-CMK;(c) 700-CMK;(d) 800-CMK;(e) 900-CMK.

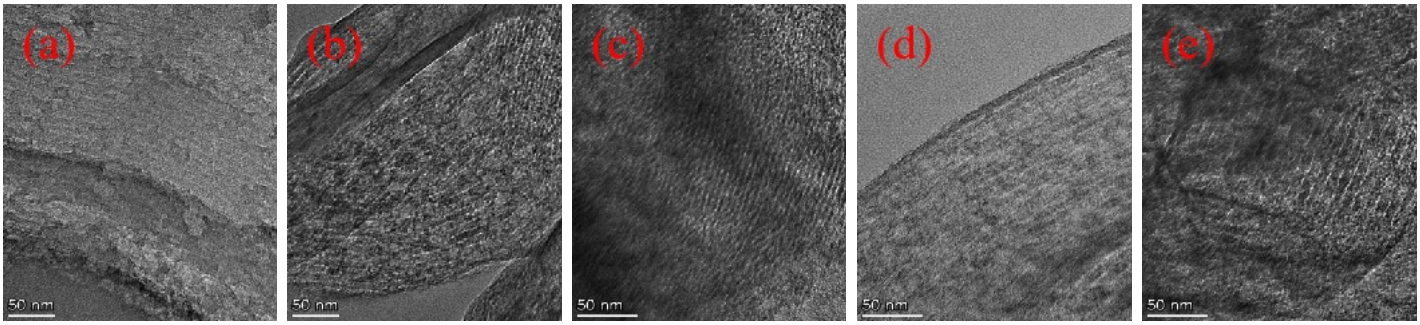

Figure S2. TEM morphology of CMK-3 at different temperatures. (a) 500-CMK;(b) 600-CMK;(c) 700-CMK;(d) 800-CMK;(e) 900-CMK.

Figures S3 and S4 display the TEM and SEM morphology, respectively, of the mesoporous carbon carrier 800-CMK-3. The scanning results of the morphology and structure of 800-CMK-3 mesoporous carbon employing high-resolution scanning electron microscopy (HR-SEM) are presented in Figure S3. The 800-CMK-3 synthesized using SBA-15 as the hard template at varying roasting times exhibited comparable morphology. As seen in the characterization diagram, the 800-CMK-3 monomer preserved its structure in the form of brief rods, with the surface progressively becoming more coarse and developing cracks. This could be attributed to two factors: firstly, the extended roasting time may lead to greater contraction of the short rods, potentially causing them to wrinkle or even break. Secondly, the increase in roasting time may contribute to irregular carbon deposition, thereby increasing surface roughness. As demonstrated in S4, altering the roasting time of SBA-15 used as a hard template during the preparation of 800-CMK-3 does not affect its structural features, and its pores remain organized and consistent. These images demonstrate that the openings undergo collapse based on variations in roasting duration, as illustrated in Figure S4. This could be attributed to the heightened carbon deposition of 800-CMK-3 as roasting time increases, which causes pore blockages. Simultaneously, the uniformity of pore thickness was not maintained during template replication, leading to the collapse of thinner sections as roasting time increases.

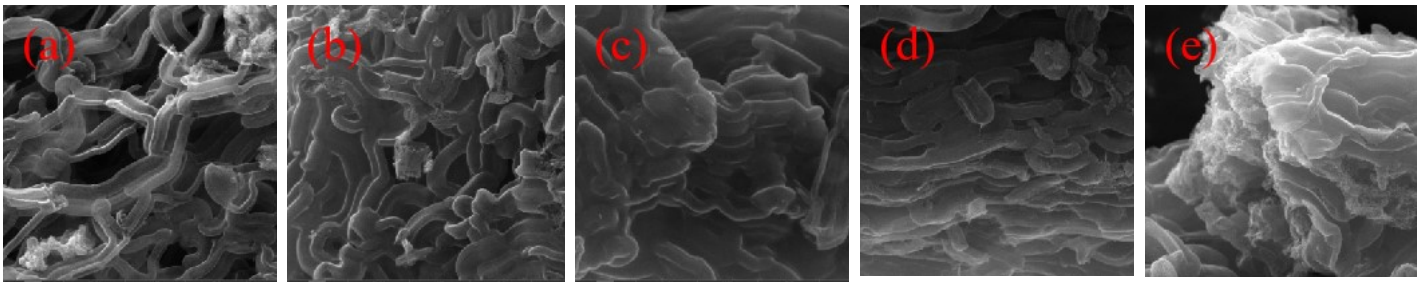

Figure S3. SEM topography of 800-CMK-3 at different times. (a) 2h; (b) 3h ;(c) 4h; (d) 5h; (e) 6h.

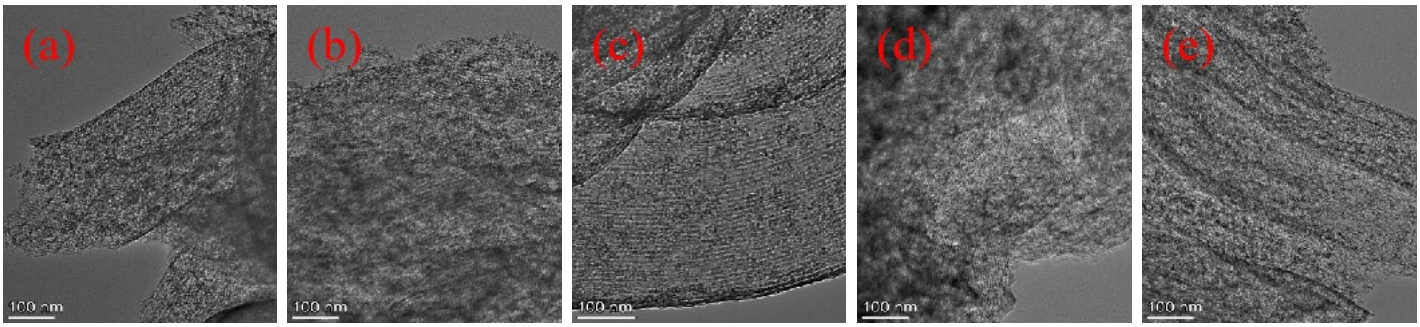

Figure S4. TEM topography of 800-CMK-3 at different times. (a) 2h; (b) 3h; (c) 4h; (d) 5h; (e) 6h.