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Supplementary Materials

Efficient Light Initiated One-Pot Synthesis of Benzimidazoles over PtS/$ZnIn_2S_4$ Promoted by RGO

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Characterizations

X-ray diffraction (XRD) patterns were obtained on a Rigaku Miniflex 600 X-ray diffractometer with Cu Kα radiation in a 2θ range of 3 to 80° at a step size of 0.02°. Raman spectroscopy was performed using an in via-Reflex Micro-Raman Spectroscopy system (Renishaw Co.) with 532 nm line of an Ar ion laser at room temperature. X-ray photoelectron spectroscopy (XPS) measurements were conducted on a PHI Quantum 2000 XPS system (PHI, USA) with a monochromatic Al Kα source and a charge neutralizer. All the binding energies were referred to the C1s peak at 284.6 eV of the surface adventitious carbon. The transmission electron microscopy (TEM) and high-resolution transmission electron microscopy (HRTEM) images were measured on a JEOL model JEM 2010EX instrument at an accelerating voltage of 200 kV. UV-visible diffuse reflectance spectra (UV-vis DRS) of the powders were obtained on a Varian cary 7000 scan spectrophotometers with BaSO4 used as a reflectance standard. The amount of Pt was detected on an inductively coupled plasma emission spectrometer (ICP, ICAP 7000 PLUS SERIES). The BET surface area was measured at −196 °C using an ASAP 2020M apparatus (Micromeritics Instrument Corp., USA). Prior to measurement, the sample was degassed under vacuum at 200 °C for 10 h. Liquid products in the catalytic reactions were analyzed on a Shimadzu GC-2014 system equipped with an HP-5 capillary column (injector: 280 °C, detector: 320 °C). Gaseous products were analyzed using a Shimadzu GC-8A 2014C system with a TCD and a 5A packed column, with both the injector and detector temperatures at 120 °C.

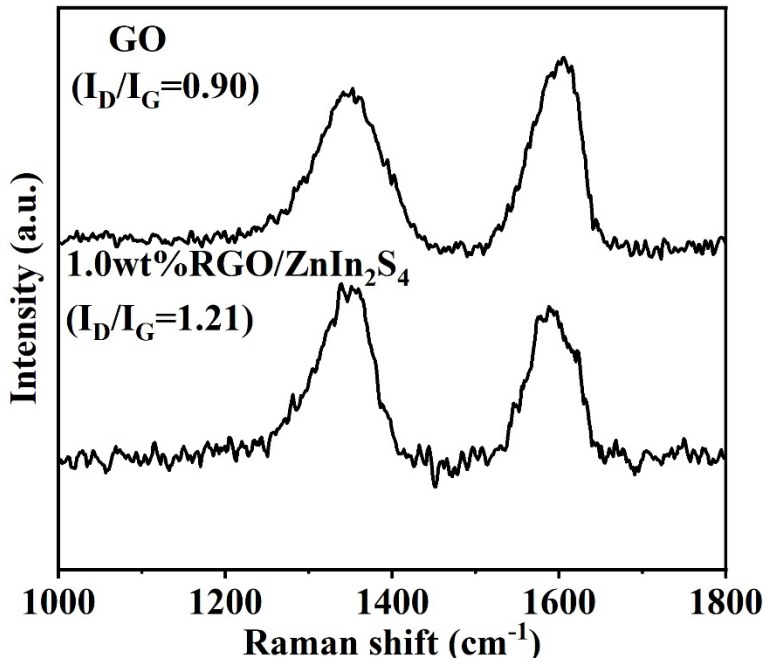

Figure S1. Raman spectra of GO and 1.0 wt% RGO/$ZnIn_2S_4$ nanocomposites.

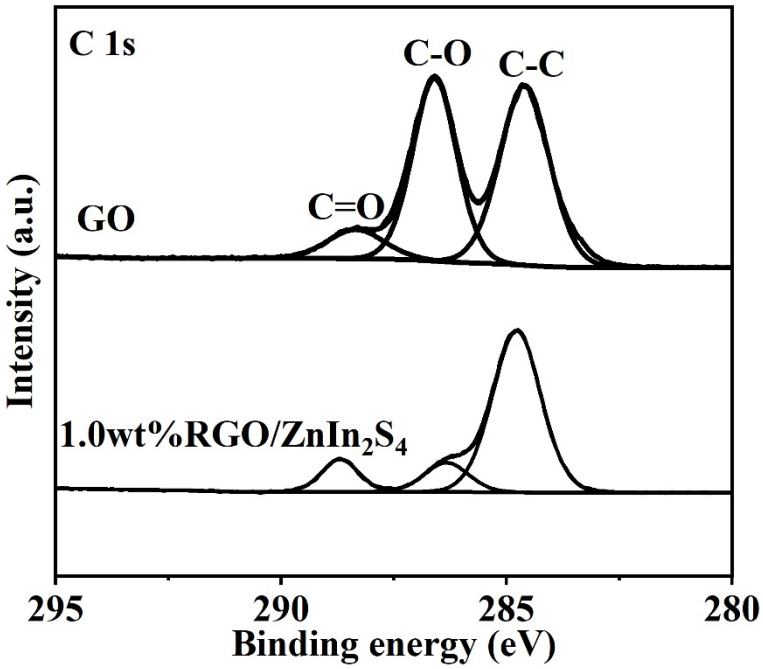

Figure S2. XPS spectra of C1s in GO and 1.0 wt% RGO/$ZnIn_2S_4$.

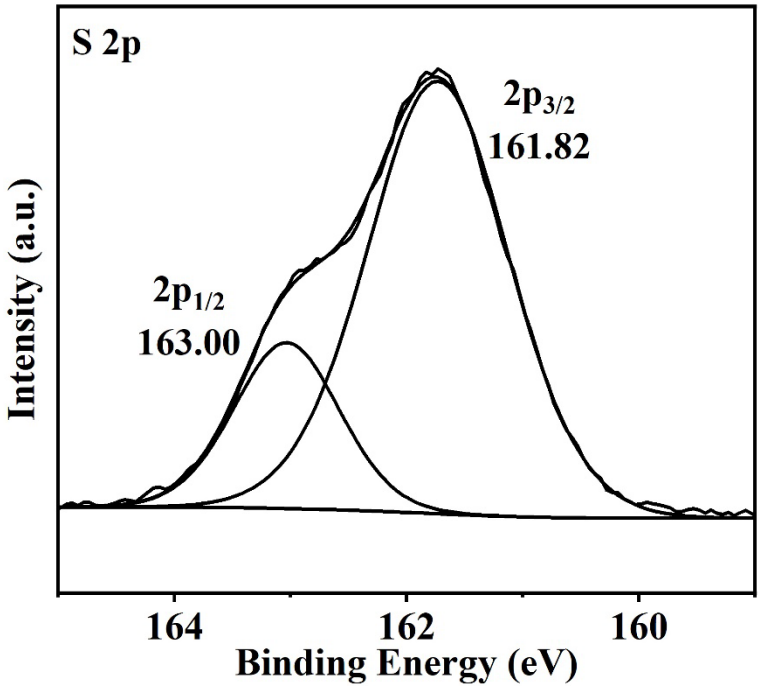

Figure S3. XPS spectrum of S 2p in 1.0 wt% RGO/$ZnIn_2S_4$.

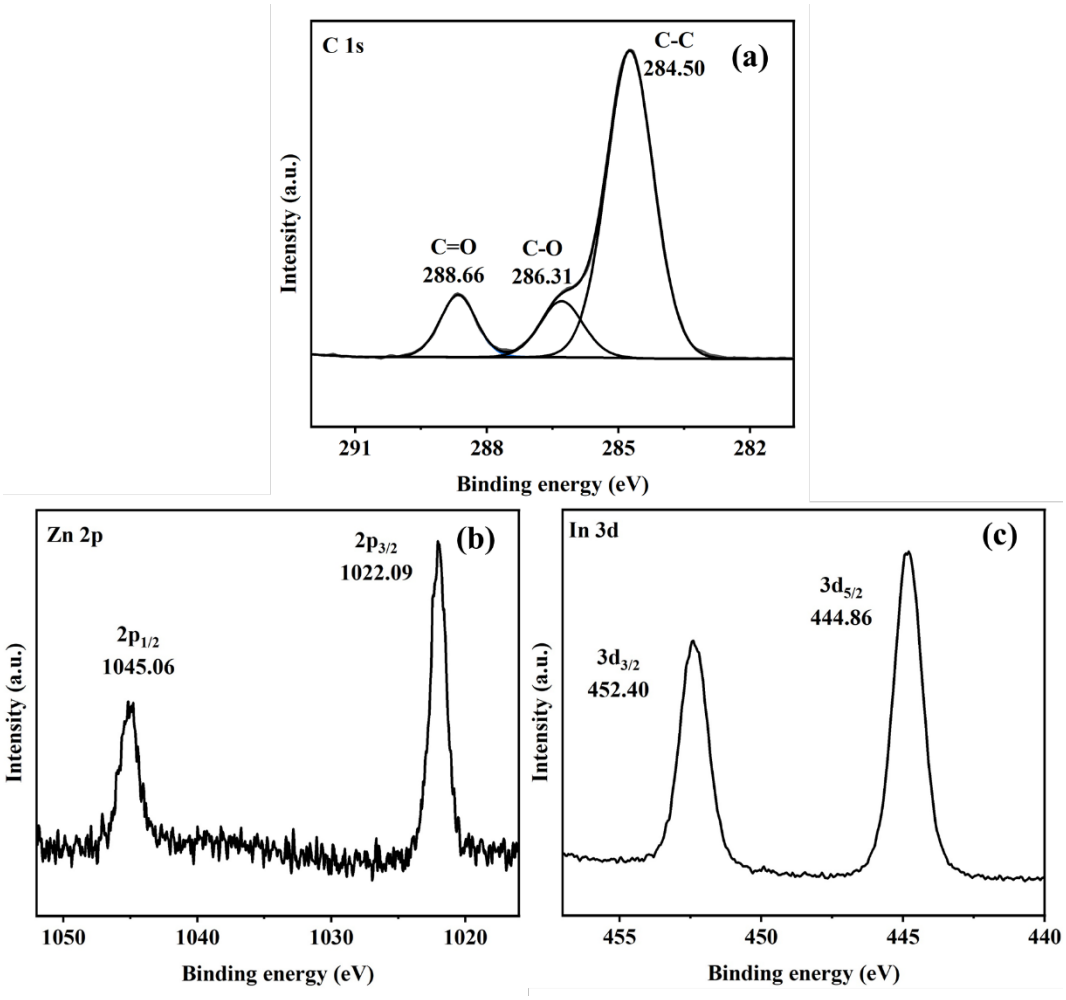

Figure S4. XPS spectra of (**a**) C1s, (**b**) Zn 2p, (**c**) In 3d in 2.0 wt% PtS/1.0 wt% RGO/$ZnIn_2S_4$.

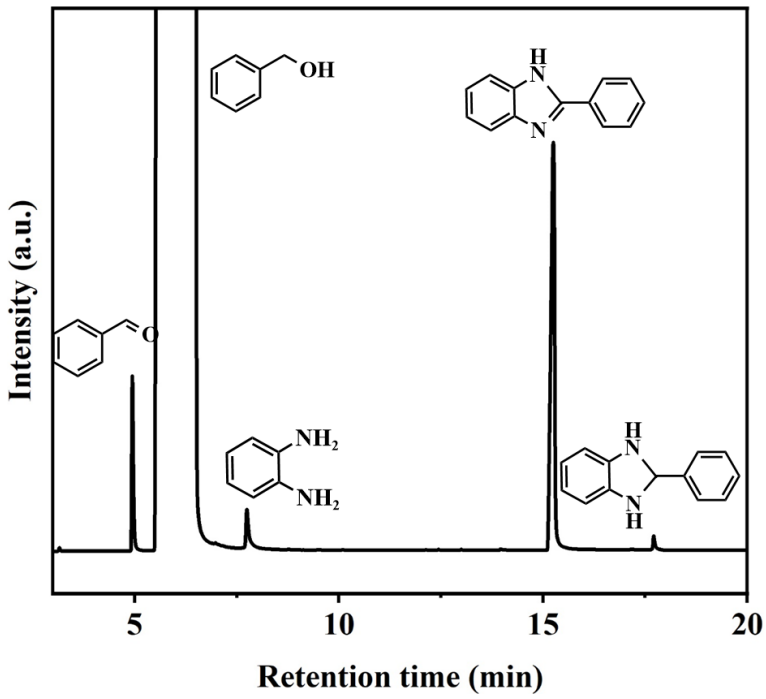

Figure S5. GC spectrum of the substrates and the products obtained from the synthesis of 2-phenylbenzimidazole from *o*-phenylenediamine and benzyl alcohol.

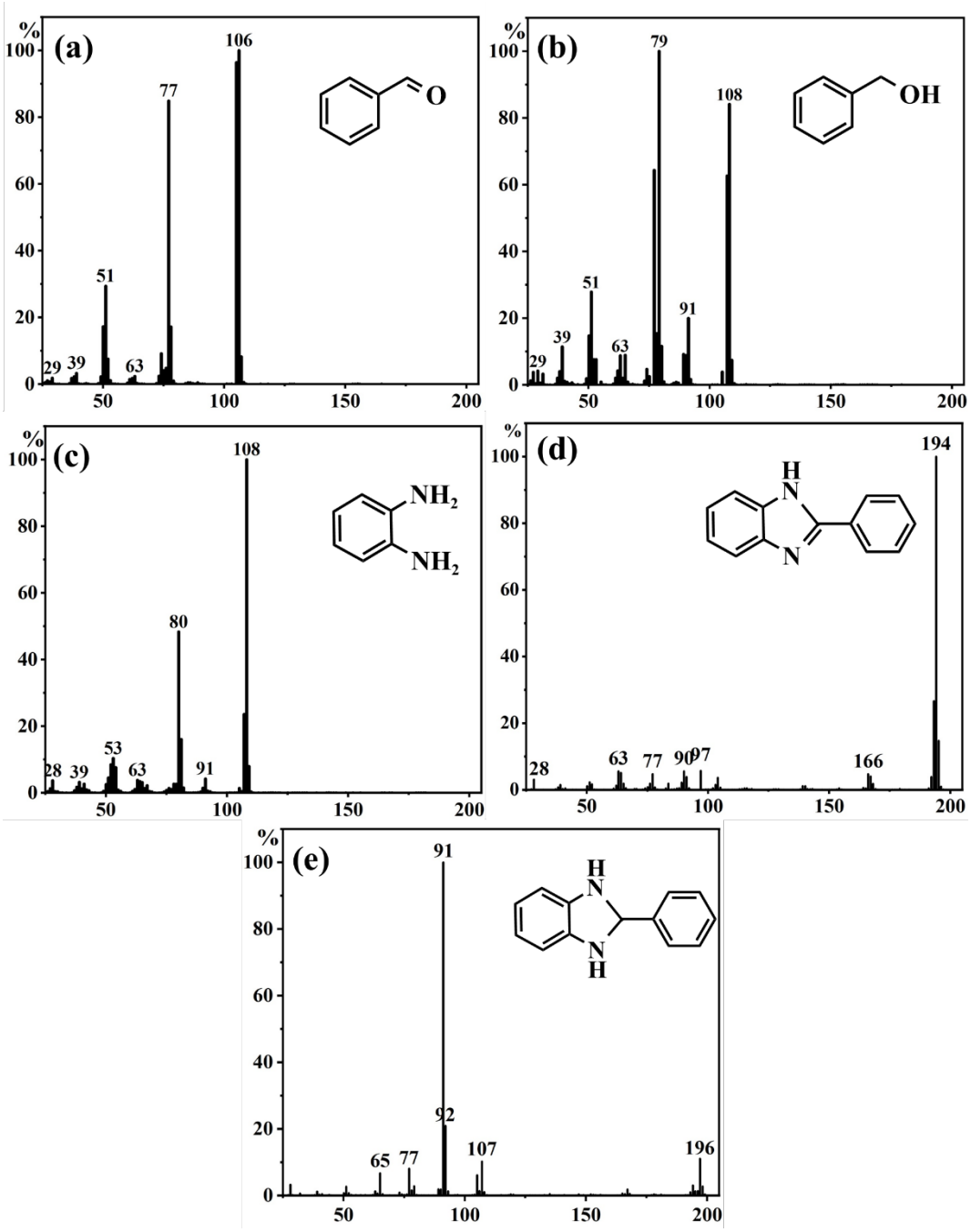

Figure S6. Mass spectra of the substrates and the products obtained from the synthesis of 2-phenylbenzimidazole from *o*-phenylenediamine and benzyl alcohol (**a**: benzaldehyde; **b**: benzyl alcohol; **c**: *o*-phenylenediamine; **d**: 2-phenylbenzimidazole; **e**: 2,3-dihydro-2-phenyl-1H-benzimidazole).

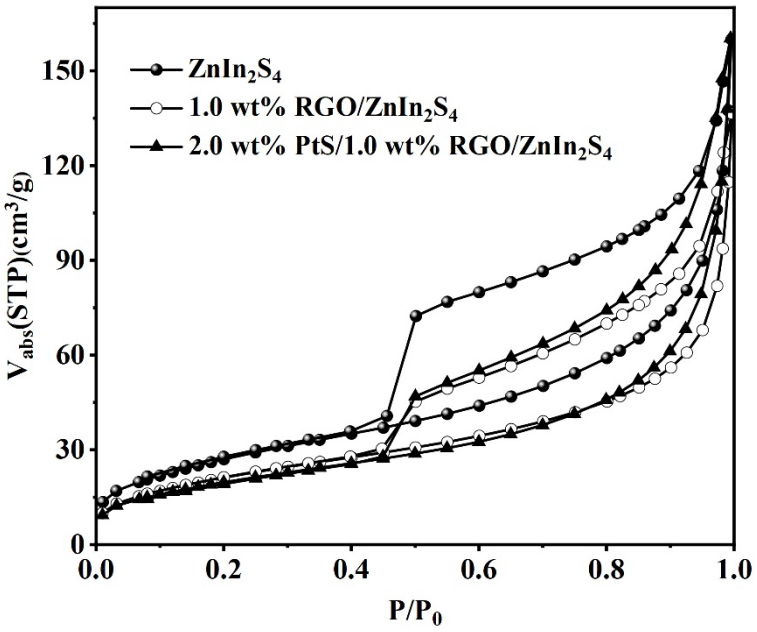

Figure S7. Nitrogen adsorption-desorption isotherms of 2.0 wt% PtS/1.0 wt% RGO/$ZnIn_2S_4$, 1.0 wt% RGO/$ZnIn_2S_4$ and $ZnIn_2S_4$.

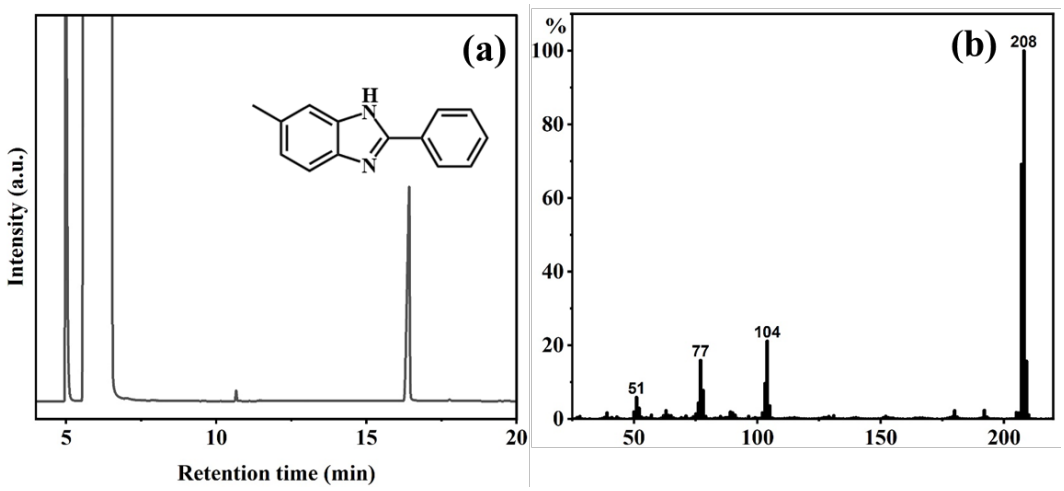

Figure S8. GC spectrum (**a**) and MS data (**b**) of the as-synthesized 6-methyl-2-phenyl-1H-benzoimidazole.

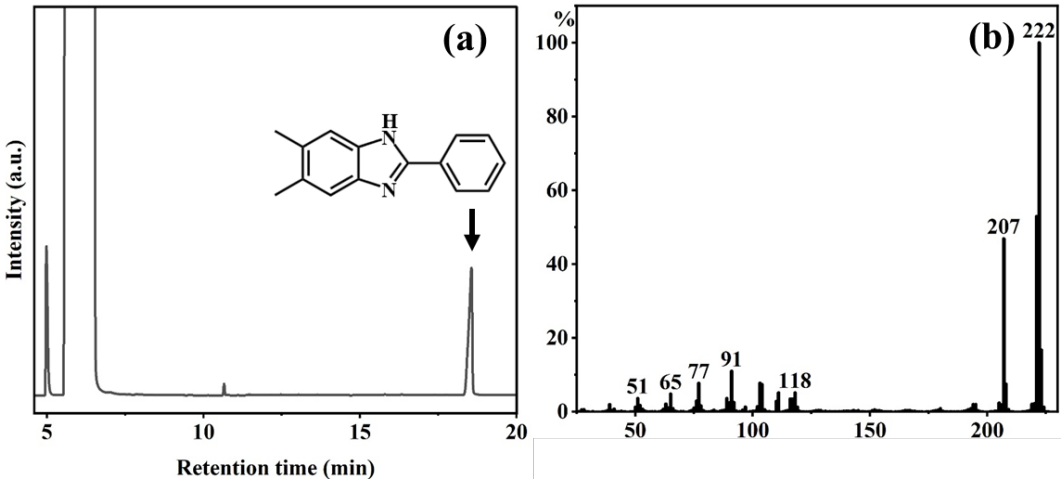

Figure S9. GC spectrum (**a**) and MS data (**b**) of the as-synthesized 5,6-dimethyl-2-phenyl-1H-benzimidazole.

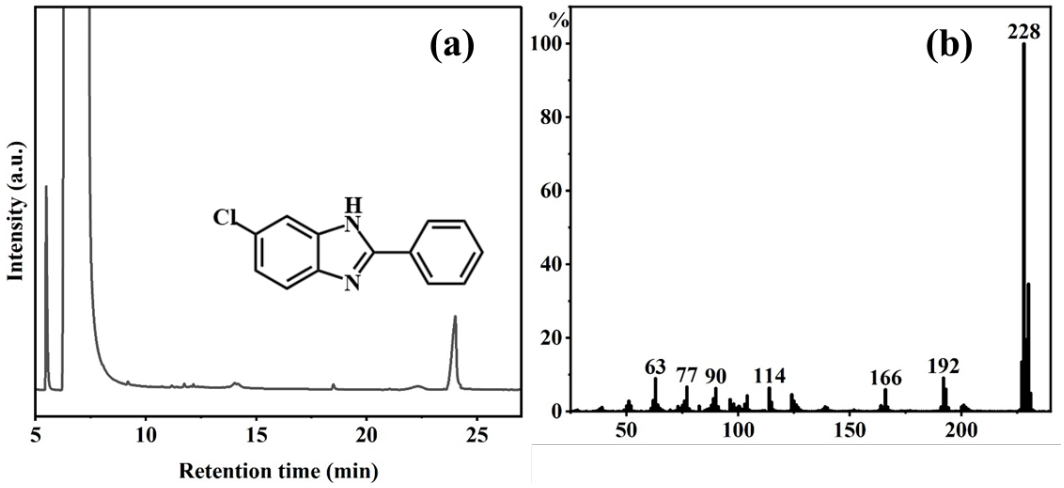

Figure S10. GC spectrum (**a**) and MS data (**b**) of the as-synthesized 6-chloro-2-phenyl-1H-benzoimidazole.

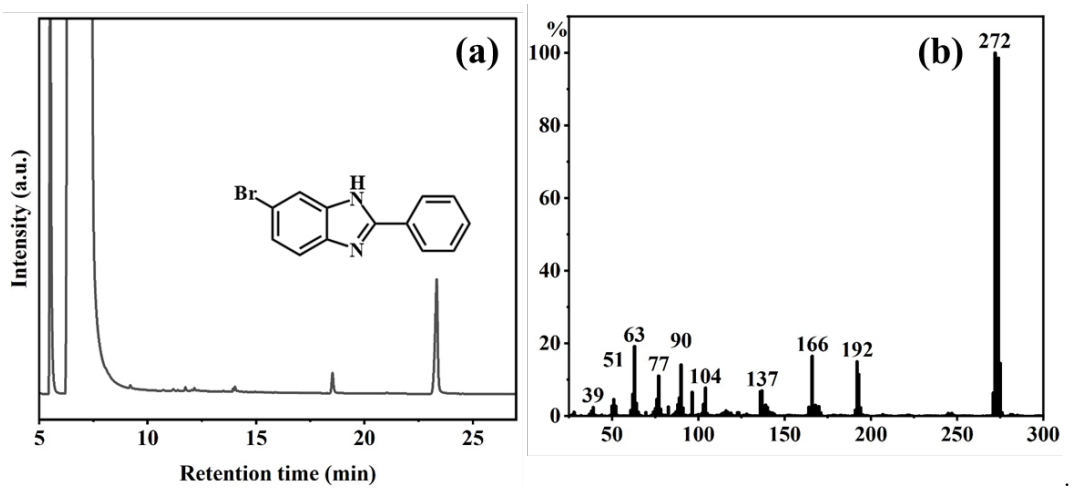

Figure S11. GC spectrum (**a**) and MS data (**b**) of the as-synthesized 6-bromo-2-phenyl-1H-benzimidazole.

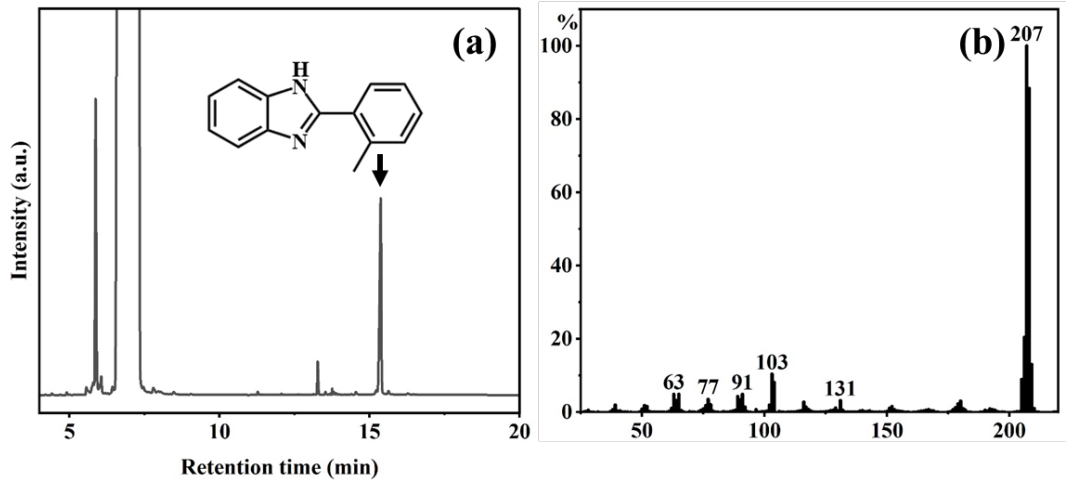

Figure S12. GC spectrum (**a**) and MS data (**b**) of the as-synthesized 2-(2-methylphenyl)-1H-benzimidazole.

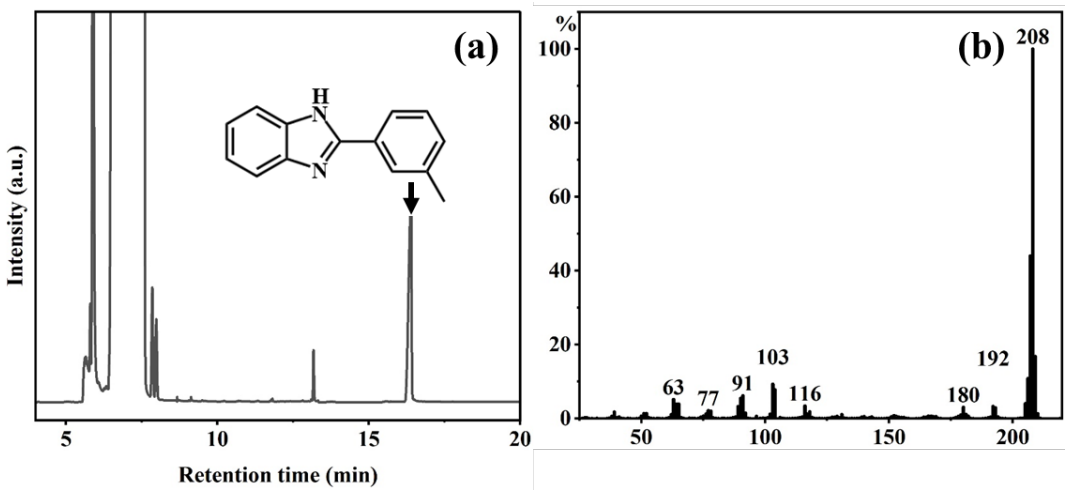

Figure S13. GC spectrum (**a**) and MS data (**b**) of the as-synthesized 2-(3-methylphenyl)-1H-benzimidazole.

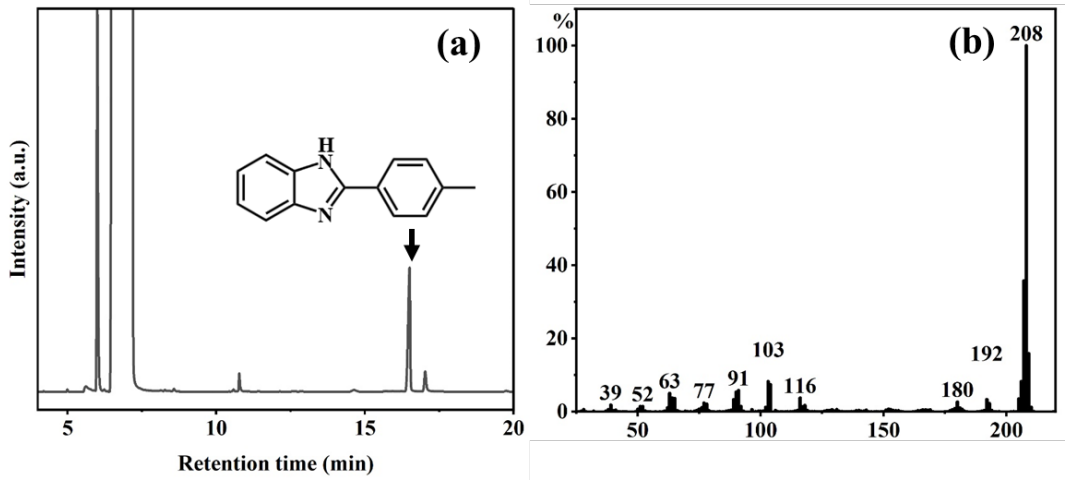

Figure S14. GC spectrum (**a**) and MS data (**b**) of the as-synthesized 2-(4-methylphenyl)-1H-benzimidazole.

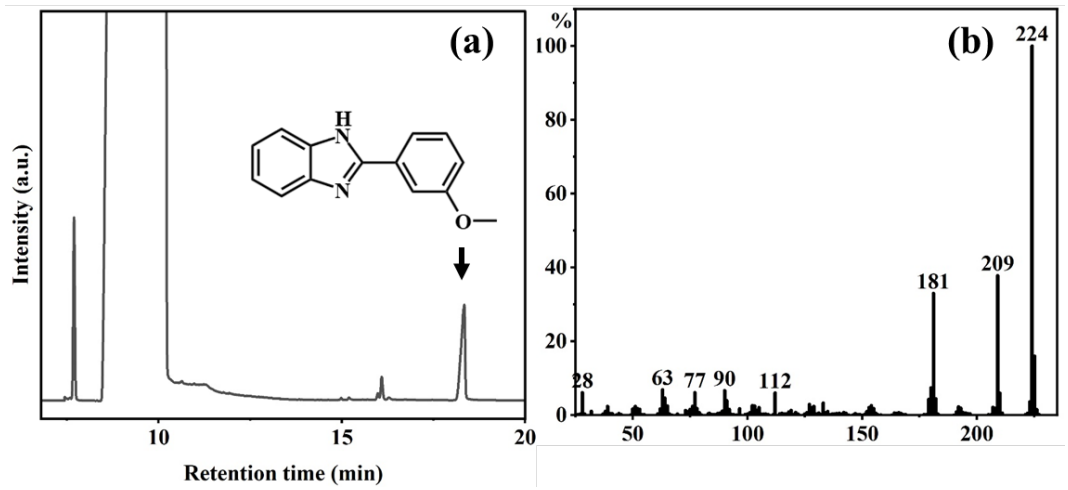

Figure S15. GC spectrum (**a**) and MS data (**b**) of the as-synthesized 2-(3-methoxyphenyl)-1H-benzimidazole.

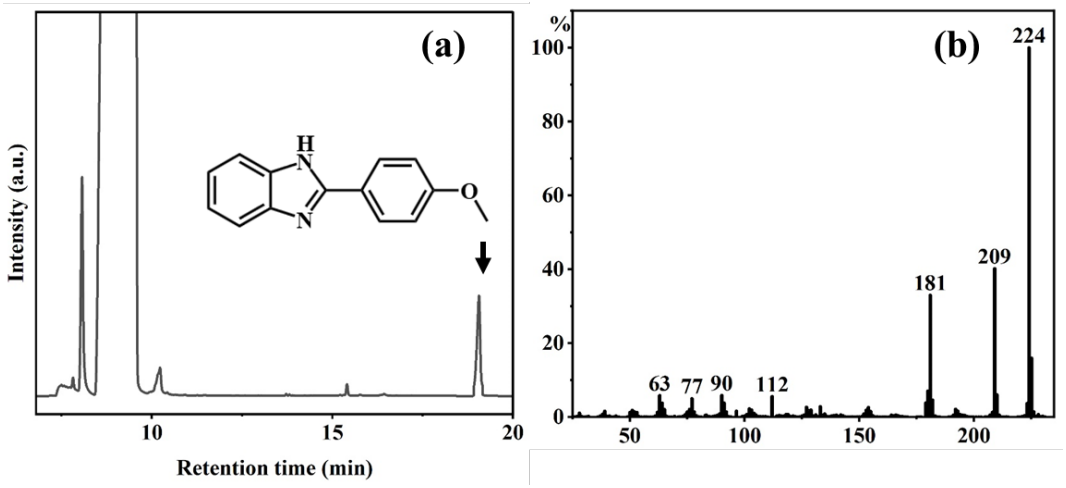

Figure S16. GC spectrum (**a**) and MS data (**b**) of the as-synthesized 2-(4-methoxyphenyl)-1H-benzimidazole.

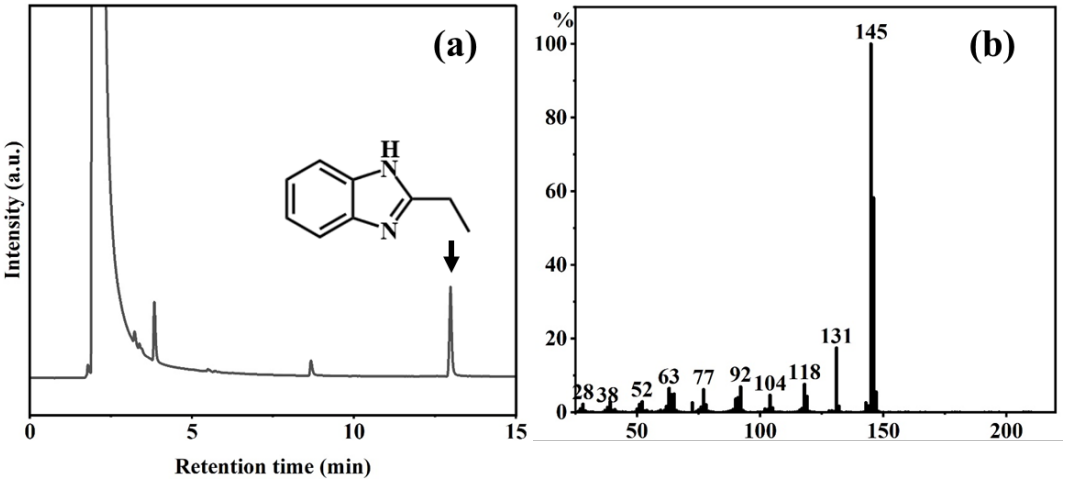

Figure S17. GC spectrum (**a**) and MS data (**b**) of the as-synthesized 2-ethyl-1H-benzimidazole.

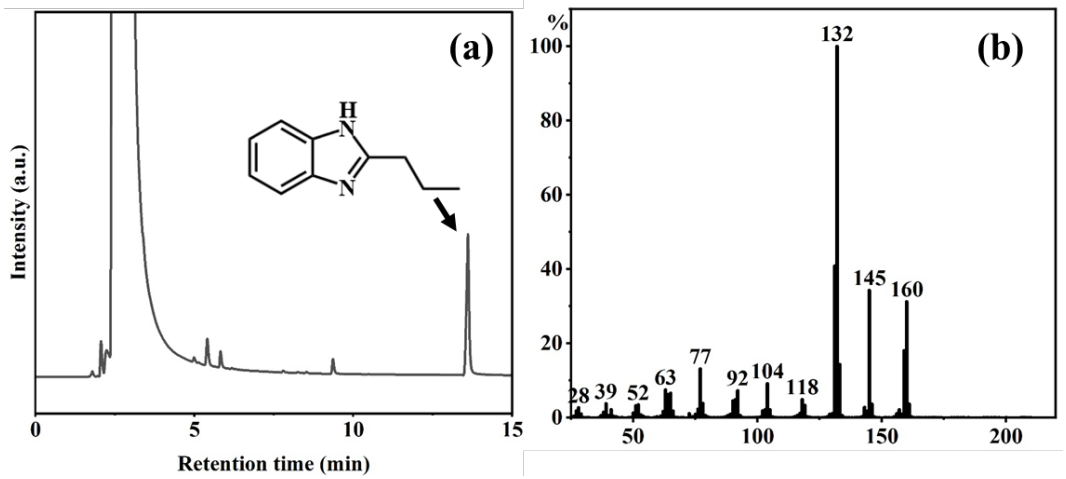

Figure S18. GC spectrum (**a**) and MS data (**b**) of the as-synthesized 2-propyl-1H-benzimidazole.