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Supplementary Materials

Developing Eco-friendly and Cost-effective Porous Adsorbent for Carbon Dioxide Capture

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Abstract: To address the issue of global warming and climate change issues, recent research efforts have highlighted opportunities for capturing and electrochemically converting carbon dioxide (CO_2). Despite metal doped polymers receiving widespread attention in this respect, the structures hitherto reported lack in ease of synthesis with scale up feasibility. In this study, a series of mesoporous metal-doped polymers (MRFs) with tunable metal functionality and hierarchical porosity were successfully synthesized using a one-step copolymerization of resorcinol and formaldehyde with Polyethyleneimine (PEI) under solvothermal conditions. The effect of PEI and metal doping concentrations were observed on physical properties and adsorption results. The results confirmed the role of PEI on the mesoporosity of the polymer networks and high surface area in addition to enhanced CO_2 capture capacity. The resulting Cobalt doped material shows excellent thermal stability and promising CO_2 capture performance, with equilibrium adsorption of 2.3 mmol CO_2/g at 0°C and 1 bar for at a surface area 675.62 m^2/g. This mesoporous polymer, with its ease of synthesis is a promising candidate for promising for CO_2 capture and possible subsequent electrochemical conversion.

Keywords: carbon dioxide; capture; mesoporous polymer; cobalt; nickel

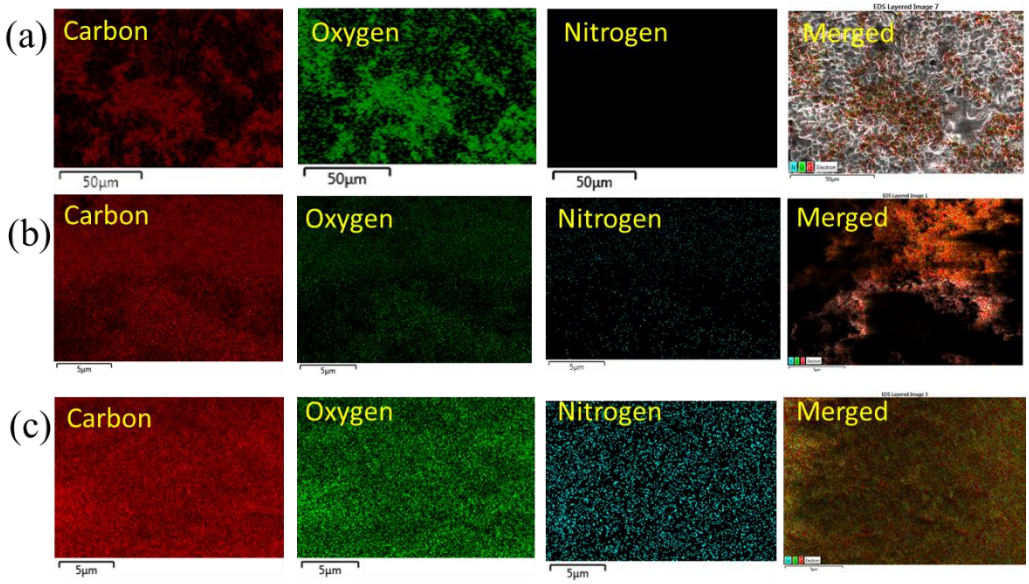

Figure S1. EDS elemental analysis of various samples: (a) RF (b) M-RF (c) H-RF.

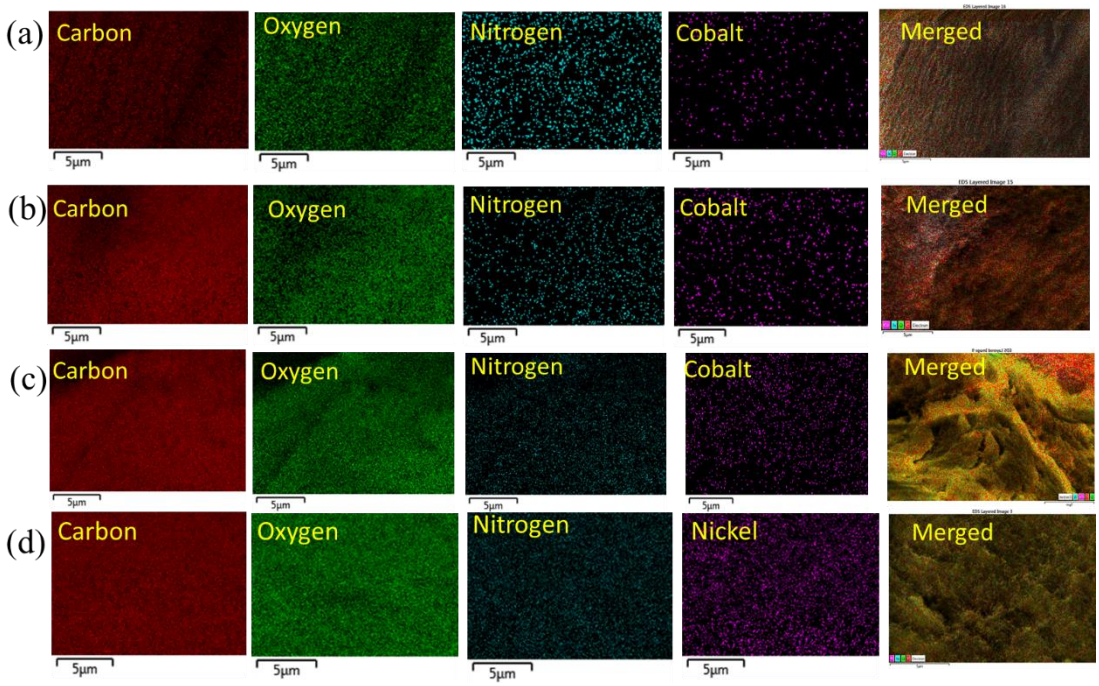

Figure S2. EDS elemental analysis of various samples: (a) Co1-M-RF (b) Co3-M-RF (c) Co5-M-RF (d) Ni3-M-RF.