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Ultra-efficient removal of NO in a MOFs-NTP synergistic process at ambient temperature

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ABSTRACT

In this work, a new MOFs-NTP synergistic method was first proposed in order to study the denitration performance. As a highly efficient MOFs material, CuBTC was synthesized by microwave method and combined with non-thermal plasma (NTP) which achieved an ultra-efficiency of 97.87% for NO removal. It was 76.77% and 64.43% higher than that of the CuBTC-alone process and NTP-alone denitration process. The influential factors and characterization analysis (SEM, XRD, N_2 adsorption-desorption isotherms, ESR, XPS) were also investigated to study the synergistic effect of the MOFs-NTP denitration process. The results showed that CuBTC could be activated by NTP and generated the coordinatively unsaturated Cu(I)/Cu(II) sites which greatly enhanced the surface catalytic activity of CuBTC. NO was mainly reduced by Cu(I) sites to N_2. Cu(II) species can also be reacted with NO to generate $Cu^{2+}\cdots$(NO) adducts. The increase of carbonyl groups (C=O) and carboxyl groups (-COO) content also improved the chemisorption property of CuBTC. The results have shown that MOFs can serve as an ultra-efficient gas pollution adsorption material and will be more widely to be used in the field of environmental protection in

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