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PREPARATION OF METAL IMPREGNATED POROUS NANO CARBON COMPOSITES FOR ADSORBING HARMFUL GAS

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Introduction

The metal impregnated activated carbon has a problem that the metal is not stabilized on the surface, and thus the metal is easily desorbed. As a method for solving this problem, metal is bound by carbon nanofibers when using the chestnut-like carbon manufacturing method. The metal-impregnated porous carbon composites prepared by this study can increase the mesopores and increase the specific surface area. Many studies have focused on the physicochemical properties of the carbon support to improve the adsorption's properties. In addition to the pore adsorption of general activated carbon, the metal adsorption can proceed simultaneously with the chemical adsorption by the metal reaction, Positive contaminants can be removed. After catalytic gasification is performed on the activated carbon subjected to the metal impregnation process, a large amount of mesoporous inner pores are formed on the activated carbon, and carbon nanofibers are grown on the surface of the activated carbon by the CVD deposition method to impregnate the outer pores. Mesoporous carbons are suitable candidates because of their appropriate structural characteristics, including high surface area, large pore size, and regularly interconnected mesopores that permit efficient diffusion of the reactants and by-products. In this study, supports made from metal - impregnated porous nano carbon composites by selective catalytic gasification of activated carbon.

Materials and Methods

The activated carbon and nickel nitrate hexahydrate used were commercially available P60 (Kuraray Chemical Co. Ltd., Japan) and Sigma-aldrich chemical Co. Ltd., USA, respectively. The activated carbon/metal catalyst blend composites with various metal catalyst contents were prepared via wet mixture using a rotary evaporator. The mixtures were then stirred for 24 h at room temperature. The prepared catalysts were filtered and washed with distilled water. Then, the metal catalysts were dried in an oven at 70 °C for 12 h. The activated carbons were then placed in a tubular furnace at 350, 400 and 450 ºC for 1h under N2 / air mixture for catalytic gasification.

Results and Discussion

CNFs grown on the activated carbon were not straight, but instead exhibited entanglements and nodes along their axes. Porous nano carbon composites indicated the generation of an intimate contact angles between CNFs and activated carbons. Such intimate contacts, and the interconnections of CNFs among the activated carbon, have been forecasted to improve the electrical conduction between the activated carbon supports. This looks like a similar shape of the chestnut.

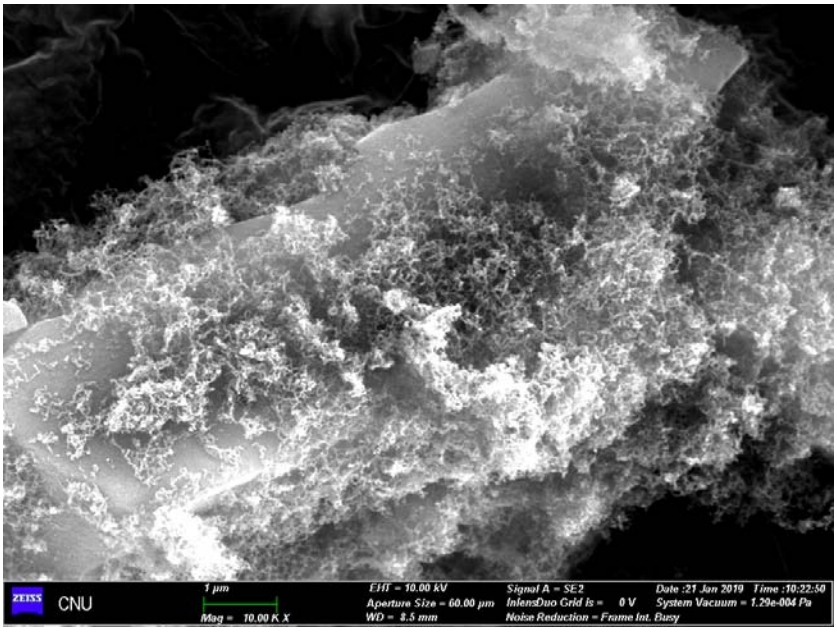

Figure 1. SEM image of metal - impregnated porous nano carbon composites

Conclusions

In this work, metal - impregnated porous nano carbon composites were made using the catalytic gasification of activated carbon and CNFs grown on the activated carbon. The greenhouse gas removal efficiency of the metal - impregnated porous nano carbon composites was increased by more than 20%.

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