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Amorphous Carbon Films on Ni using with CBr_4 by Thermal Atomic Layer Deposition

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We deposited the carbon films on Ni substrates by thermal atomic layer deposition (th-ALD), for the first time, using carbon tetrabromide (CBr_4) precursors and H2 reactants at two different temperatures (573 K and 673 K). Morphology of carbon films was characterized by scanning electron microscopy (SEM). The carbon films having amorphous carbon structures were analyzed by X-ray photoemission spectroscopy (XPS) and Raman spectroscopy. As the working temperature was increased from 573 K to 673 K, the intensity of C1s spectra was increased while that of O1s core spectra was reduced. That is, the purity of carbon films containing bromine (Br) atoms was increased. Also, the thin amorphous carbon films (ALD 3 cycle) were transformed to multilayer graphene segregated on Ni layer, through the post-annealing and cooling process.

Keywords: Atomic layer deposition, Amorphous carbon, Carbon tetrabromide, Graphene

C-1

Thermal Stability of $MnOx-WO_3-TiO_2$ Catalysts Prepared by the Sol-gel Method for Low-temperature Selective Catalytic Reduction

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The selective catalytic reduction (SCR) of NOx by NH_3 is well known as one of the most convenient, efficient, and economical method to prevent NOx emission in flue gas from stationary sources. The degradation of the reactivity is the obstacle for its real application, since high concentrations of sulfur dioxide and thermal factor would deactivate the catalyst. It is necessary to develop high stability of catalysts for low-temperature SCR. Among the transition metal oxides, WO_3 is known to exhibit high SCR activity and good thermal stability. The $MnOx-WO_3-TiO_2$ catalysts prepared by sol-gel method with various WO_3 contents were investigated for low-temperature SCR. These catalysts were observed in terms of micro-structure and spectroscopy analyses. The WO_3 catalyst as a promoter is used to enhance the thermal stability of catalyst since it increases the phase transition temperature of TiO_2 support. It was found that the addition of tungsten oxides not only maintained the temperature window of NO conversion but also increased the acid sites of catalyst.

Keywords: Low-temperature selective catalytic reduction, Degradation, Thermal stability, $MnOx-WO_3-TiO_2$ catalyst