課題番号 :2017A-E18
利用課題名（日本語） :Pd 系および Ni 系の触媒反応メカニズムの解明
Program Title (English) :The study of the catalytic reactions mechanisms on Pd- and Ni- based catalysts
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キーワード：

1. 概要（Summary ）

The mechanism of the hydrogen chemical adsorption process on the Pd(110) single crystal was investigated to clarify the hydrogen activities on the Pd atoms, which is one of the important factors for the CO_2 hydrogenation reaction on the Pd-based catalysts. In addition, the formic acid decomposition processes on the Pd-based alloys, PdCu(fcc), PdCu(B2) and PdAg alloys were observed to understand the formic acid dehydrogenation reactions on the Pd-based alloys with different compositions and structures.

2. 実験(目的,方法)（Experimental）

All the experiments are performed by using the real-time X-ray photoelectron spectroscopy. The samples are the commercial PdCu alloy and PdAg alloy foils. The sample cleaning was conducted by several cycles of sputtering and annealing.

3. 結果と考察(Results and Discussion)

In the hydrogen adsorption on Pd(110) experiment, the Pd 3d core-level spectra were measured during the hydrogen exposure at 5×10^{-6} Pa at room temperature. We found that there is almost no chemical shifts during H_2 exposure and the intensity of surface Pd component slightly decreased and that of bulk Pd component slightly increased with the H_2 exposure, and almost have no changes soon. It indicates that the hydrogen adsorption occurs slowly and soon no hydrogen further adsorbed on the surface at room temperature.

In the formic acid decompositions on PdCu(fcc), PdCu(B2) and PdAg alloys, C 1s spectra were measured during the formic acid exposure at room temperature at 1×10^{-7} Pa, 1×10^{-7} Pa, 2×10^{-5} Pa, respectively. We observed that the amounts of formic acid adsorbed on the surface, the amount of formate and CO decomposed from formic acid, and the formation speeds of formate and CO on the different alloy surfaces were much different with the exposure time as shown Fig. 1. It indicates that the mechanisms of formic acid decomposition and the reactivities of the formate formation are quite different depending on the surface compositions and

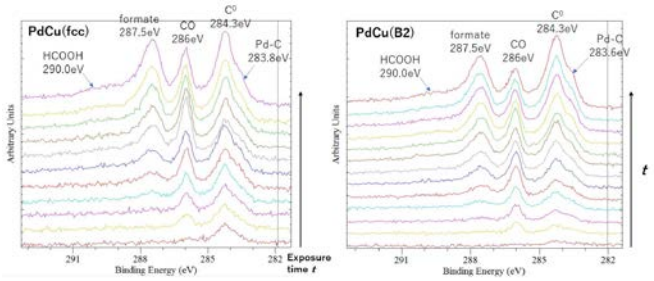

Fig.1 C 1s spectra observed duing formic acid exposure on PdCu(fcc) and PdCu(B2) alloy surfaces at room temperature.

structures of the Pd-based alloys.

4. その他・特記事項（Others）

なし。