

Preparation and Characterization of Pd/CeO₂/Ta/Si model catalysts

김도희, 우성일

한국과학기술원 화학공학과

M-CeO₂ (M : noble metal) catalysts have been widely studied as three-way catalysts and methanol synthesis catalysts. Ceria is thought to play a number of roles in these catalysts. The Ce(IV)/Ce(III) redox pair may store/release gases under oxidizing/reducing conditions⁽¹⁾, extending the operational window. Additionally, metal-ceria interactions lead to several effects, including the dispersion of the active components and promoting the activation of molecules such as CO or NO⁽²⁾. Pd is a promising component to current TWC formulations and behaves particularly well when compared with Pt and Rh-based catalysts for low-temperature oxidation of CO and hydrocarbon⁽³⁾. However, the effect of Pd-ceria interactions on the physicochemical properties of Pd and the redox properties of Ce is not elucidated yet. In order to know exactly about the metal-ceria interactions, the model study are expecting to give a better environment, resulting in the wide use of the surface science tools.

The substrate was Si(100) wafer, on which Ta metal was sputtered as a thickness of 100 nm. The CeO₂ thin film of 30 nm was deposited by using the magnetron sputtering. Spin coating and magnetron sputtering methods were used to make the Pd thin film layer. The prepared sample was investigated by *in-situ* XPS, AES, SEM and AFM analysis.

[References]

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