

CARBON OXIDATION OVER SILVER/PEROVSKITE-TYPE OXIDE COMPOSITE CATALYSTS

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The removal of particulate matter (PM) is successively developed as a new catalytic process for the environmental protect. Up to date, silver-loaded ceria (Ag/CeO_2) catalyst has been reported to be the potential catalyst for the removal of PM [1]. However, little is known about the catalytic activity of Ag-loaded perovskite-type oxide for PM oxidation although it has been reported that $\text{La}_{1-x}\text{Sr}_x\text{CoO}_3$ and LaFeO_3 catalysts are active for PM oxidation [2]. In the present study, the catalytic activity over silver-perovskite-type oxide composite catalyst such as Ag/LaFeO_3 and Ag/LaCoO_3 etc. was examined for the oxidation of carbon as a model compound of PM. The catalysts were prepared by two different methods: a conventional impregnation method with silver nitrate solution on perovskite-type oxide (Method I) and a thermal decomposition of heteronuclear cyano-complex adsorbing Ag ions (Method II) to yield Ag-loaded perovskite-type oxide composite catalysts [3, 4].

Figure 1 shows the carbon oxidation activity (CO_2 concentration) over Ag/LaFeO_3 catalysts prepared by Methods I and II as a function of temperature. No or less promotive effect of Ag addition on the catalytic activity was observed for carbon oxidation of perovskite-type oxide prepared by Method I. On the other hand, Method II was significantly effective for enhancing the catalytic activity of carbon oxidation. The catalytic activity of Ag/LaFeO_3 prepared by Method II was comparable to that of Ag/CeO_2 which has been considered to be the potential candidate for PM oxidation. FE-SEM measurements demonstrated that Ag/LaFeO_3 prepared by Method II provided high dispersion state of Ag particles, compared with Ag/LaFeO_3 prepared by Method I.

[1] Shimizu et al., *Catal. Today* 175 (2011) 93; E. Aneggi et al., *Appl. Catal. B* 91 (2009) 489; Wagner et al., *Appl. Catal. B*, 183 (2016) 28.

[2] Prasad et al., *Appl. Catal. A* 447 (2012) 100; Xiao et al., *Catal. Today* 258 (2015) 660.

[3] Yahiro et al., *Catal. Surv. Asia* 13 (2009) 221; *Catal. Today* 175 (2011) 534.

[4] Yamaura et al., *Catal. Today* 332 (2019) 89.

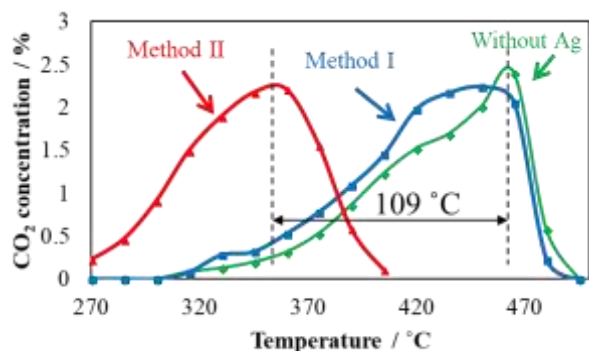


Figure 1. TPR profiles of Ag/LaFeO_3 catalysts prepared by Method I and II and LaFeO_3 without Ag loading.