

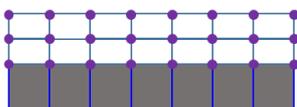
Crystallinity of Perovskite Thin Films Supported on Different Oxides

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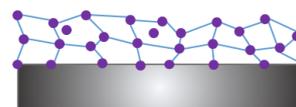
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Perovskite thin films decorated with catalytic metals supported on high-specific-area oxides have demonstrated fascinating catalytic performance and impressive stability in reforming reactions of hydrocarbons¹ and automotive emission control². In present research, we investigated the interaction between the perovskite overlayer and its supporting oxide. LaFeO₃ and CaTiO₃ thin films with equivalent thickness of ~0.5 nm were deposited to different supporting materials such as MgAl₂O₄, γ -Al₂O₃ and amorphous SiO₂. X-ray diffraction results shown that films deposited to the crystalized supports tend to possess high degree of crystallinity after high temperature oxidation, while those deposited to the amorphous support (SiO₂) did not crystallize themselves during the same oxidation process. Catalytic performance of Pt-LaFeO₃ thin film supported on SiO₂ was tested and compared with Pt-LaFeO₃ supported on MgAl₂O₄. Both catalysts showed similar catalytic performances in CO oxidation reaction, however LaFeO₃ thin film deposited to SiO₂ was less stable than its analog supported on MgAl₂O₄. Metallic Fe and La₂O₃ were found in the XRD pattern of the SiO₂ supported sample after reduction at 1073 K, which has never been seen in the MgAl₂O₄ supported systems.

Perovskite film formed on crystalized support



Film formed on amorphous support



References

- [1] Lin, C.; Jang, J.B.; Zhang, L.; Stach, E.A.; Gorte, R.J, *ACS Catal.*, **8** (2018) 7679.
- [2] Mao, X.; Foucher, A.C.; Montini, T.; Stach, E.A.; Fornasiero, P.; Gorte, R.J, *J. Am. Chem. Soc.*, **142** (2020), 10373.