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Densification of metal oxide films synthesized from metal complexes by flame spraying

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Abstract

In this study, we synthesized dense metal oxide films from a metal-ethylenediaminetetraacetic acid complex using a flame sprayer. Erbium oxide (Er_2O_3)、Yttrium oxide (Y_2O_3) films were synthesized on stainless steel substrates using N_2, air (O_2 + N_2), or O_2 as the carrier gas and a H_2-O_2 mixture as the combustion gas. When O_2 was used as the carrier gas, 9.9-20.5 μm-thick oxide layers were deposited on the SUS substrate. The cross-sectional porosities of the films were 3-5%. In contrast, oxide layers with 8.1–15.8 μm thickness were synthesized on stainless steel substrates when N_2 and air were used as the carrier gases. The cross-sectional porosities of these films were 16.1–23.4%. These results indicated that the carrier gas plays an important role in determining the thickness and porosity of the resulting film.