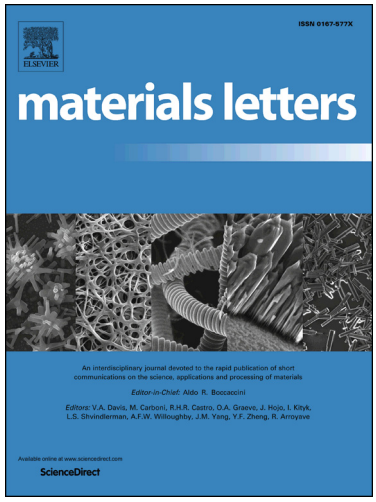

Ten micron-thick undoped SnO_2 layers grown by spray pyrolysis for micro-heater fabrication

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Ten micron-thick undoped SnO_2 layers grown by spray pyrolysis for microheater fabrication

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Abstract

Micron-thick layers of tin oxide are advantageous for the fabrication of high power density transparent microheaters operating at elevated temperatures and harsh environments. Here, we report growing ~10 µm-thick undoped SnO_2 on alumina substrates and using the produced layers for the fabrication of long life microheaters operating at temperatures as high as 1000 °C. The spray pyrolysis of tin chloride dissolved in pure ethanol on hot alumina chips is utilized for layer deposition. The morphology of the grown crystallites is determined by the substrate temperature while the growth rate is temperature-independent in the 300-500 °C range. The average grain size in the layers grown at higher substrate temperatures is larger, but the microstructure is hardly altered by subsequent thermal annealing at 600 °C. The 10 µm-thick layers are mainly comprised of large (110) facets; this dominance becomes more profound at higher growth temperatures. The produced layers are utilized for long life high power density microheater fabrication; the resistance change recorded over six months of continuous operation at 350 °C is less than 5%. These devices withstand short term operation at temperatures as high as 1000 °C.

Keywords: Spray pyrolysis; Tin oxide; Thick films; Deposition; Transparent conductor; Microheater;

Introduction

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