

# Application of Boron Oxide as Protective Surface Treatment to Decrease the Air Reactivity of Carbon Anodes

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## Abstract

Oxidation of carbon anode with air and CO<sub>2</sub> occurs during the electrolysis of alumina in Hall-Héroult cells, resulting in a significant overconsumption of carbon and dusting. Boron is well known to decrease the rate of this reaction for graphite. In this work, the application of boron oxide has been investigated to evaluate its inhibition effect on the air oxidation reaction and to provide an effective protection for anodes. Different ways of impregnation coating have been explored. Impregnated anode samples were gasified under air at 525 °C according to the standard measurement methods. X-ray tomography was used to obtain the microstructural information of the samples before and after air-burning tests. The impregnated samples showed a very low oxidation reaction rate and dust generation.

**Keywords:** Anode air reactivity; boron oxide anode coating; anode impregnation coating; anode sample gasification; X-ray tomography.