

A Non-Destructive Technique for the On-Line Quality Control of Green and Baked Anodes

Abderrahmane Benzaoui¹, Duygu Kocaefe², Dipankar Bhattacharyay³ and Yasar Kocaefe⁴

1. Postdoctoral fellow
2. Professor, Carbon Chair
3. Research professor
4. Research professor

University Research Centre on Aluminum (CURAL) - Aluminum Research Centre (REGAL)
University of Quebec at Chicoutimi, Chicoutimi, Quebec, Canada
Corresponding author: Duygu_Kocaefe@uqac.ca

Abstract

Carbon anodes play an important role in the electrolytic production of aluminum. They have a significant impact on economics and environment. Carbon anodes are made of dry aggregates, composed of petroleum coke, recycled rejects, and butts, bound by coal tar pitch. Due to several factors, cracks and defects appear in anodes during the fabrication process, affecting their quality. It is thus essential to control the quality of anodes before their use in the electrolysis cell. Current practice for the quality evaluation (visual inspection, core analysis) gives limited information. As an alternative to this practice, the electrical resistivity measurement, one of the key indicators for anode quality and its homogeneity, can be used. A simple and non-destructive method has been developed for the specific electrical resistivity measurement of anodes (SERMA) for on-line control of anode quality. Various tests have been carried out at both lab scale and industrial scale. In this study, the resistivity distributions in the lab scale anodes were measured and compared with those of the tomography analysis. The method is able to detect defective anodes even before the baking process.

Keywords: Carbon anodes; quality control; non-destructive method; electrical resistivity.