Ebatco Nano
A Bimonthly Newsletter

Nano Brief

Ebatco will be exhibiting at **SEMICON WEST,** July 9-11, 2024. We will be thrilled to see you in San Francisco then! Please stop by Booth #6810 to discuss the incredible world of semiconductor materials, microelectronic devices, and nano/micro scale surface characterization and failure analysis of these materials and devices with our staff scientists.

This year we have also scheduled to exhibit at the following upcoming events:

- October 2-4 – BioInterface Workshop and Symposium, McNamara Alumni Center, Minneapolis, MN.
- October 16-17 – MD&M Minneapolis, Booth #2838, Minneapolis Convention Center, Minneapolis, MN.

Ebatco Publishes a White Paper on Testing of Semiconductor and Microelectronic Materials

Ebatco has published a white paper on nano/micro scale analysis, characterization and testing of semiconductor and microelectronic materials. Encouraged by the Biden Administration's CHIPS and Science Act and the booming private semiconductor manufacturing investments, Ebatco has analyzed the testing needs of semiconductor and microelectronic industries and responded with a suite of contract lab service solutions. Request your own free copy of the white paper at info@ebatco.com.

Ebatco

As we continue to grow our business, we have hired on a new talent to expand our expertise and testing lab service offerings. Please join us in welcoming the newest addition to the Ebatco team: Dr. Lawrence Anderson, Materials Scientist.

Dr. Anderson received his B.S. degree in Materials Science with an emphasis in Nanotechnology from the University of California, Merced, and he received his Ph.D. in Materials Science from the University of Illinois, Urbana-Champaign in 2023. His undergraduate research focused on catalysis and polymeric nanofiber catalyst supports for low temperature, Proton Exchange Membrane Fuel Cells. His doctoral work transitioned to research on functional oxide materials that have applications in high temperature electrochemical cells (fuel cells, batteries), gas separation membranes, electronics, and chemically-driven actuators. This work largely focused on improving the understanding of structure-property relationships in perovskite oxides, with the goal of developing materials design rules to tailor chemo-mechanical responses. His undergraduate and graduate work led to his authorship in 7 peer-reviewed scientific publications.

Dr. Anderson will utilize his experience in linking atomic, nano, and bulk characterization results to materials properties and responses while supporting customer needs at Ebatco.

New Toll-Free Number for Ebatco

Because of the previous phone service provider service issues, Ebatco has to initiate a new toll-free number, 1866-832-2826 or 1866-8Ebatco to connect with you. This new toll-free number replaces the previously used toll-free number 1844-332-2826 or 1844-3Ebatco. Please update your record for us. Thank you.

Case Study

Aluminum Concentrations in Deodorants Determined Through ICP-OES

Deodorants serve as indispensable personal care products that are designed to minimize body odor by inhibiting perspiration and bacterial growth. Among the active ingredients in deodorant formulations, Al^{3+} (aluminum (III)) salt plays a key role in limiting perspiration. The antiperspirant effect occurs when Al^{3+} salt hydrolysis to form an occlusive mass to stop the flow of sweat to the skin’s surface.

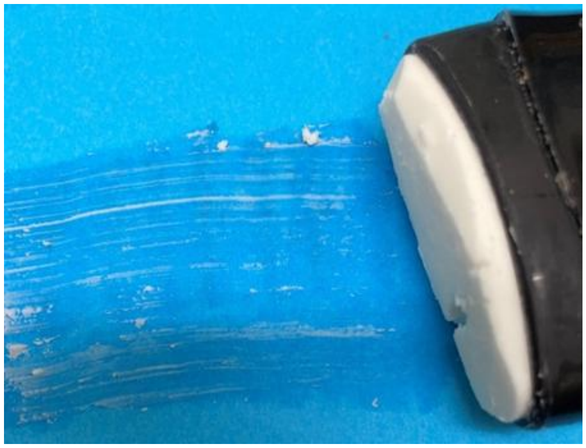

Figure 1. Visualization of deodorant application.

However, concerns have been raised regarding some potential adverse effects of aluminum on skin health, including irritation and allergic reactions. As a result, the precise determination of elemental concentrations in deodorants, especially for aluminum, becomes very important in order to ensure both product efficacy and product safety for consumers.

In this study, elemental concentrations of three distinct deodorant samples were analyzed utilizing Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) at Ebatco. ICP-OES enables simultaneous detection and quantification of numerous elements with high precision and sensitivity, offering a comprehensive assessment of elemental composition in complex matrices. This study was aimed to provide some insights into the elemental compositions of deodorant formulations currently available on the commercial market, particularly on aluminum concentrations.

Three commercially available deodorant samples were selected and purchased from stores for elemental analysis. Each sample, including a spiked matrix sample and a method blank, underwent acid digestion to solubilize its components prior to analysis on an ICP-OES instrument. Deodorant #1 and Deodorant #2 were labeled with no aluminum as an ingredient while Deodorant #3 had aluminum listed in its ingredient list.

A matrix spike was added to deodorant #1 at 30 ppm and the recovery was found to be within the acceptable range of ±20%. Additionally, a method blank was run to show the instrument was running efficiently and the process had no residual cross contamination between samples.

Table 1 Elemental Concentrations of Commercial Deodorant Samples

Sample / Element	Deodorant #1 (ppm)	Deodorant #2 (ppm)	Deodorant #3 (ppm)	Deodorant #1 with Matrix Spike (ppm)
Aluminum (394.4 nm)*	0.02	0.04	122.63	0.36
Copper (324.7 nm)*	0.00	0.00	0.00	0.32
Iron (239.5 nm)*	0.03	0.02	0.11	0.34
Manganese (257.6 nm)*	0.01	0.00	0.00	0.30
Nickel (231.6 nm)*	0.00	0.00	0.00	0.30
Zinc (213.8 nm)*	0.02	0.01	0.06	0.28

*Optical emission wavelength used for the elemental concentration analysis in ICP-OES

The results of the elemental analysis for the deodorant samples were summarized in Table 1. As can be seen from Table 1, varying concentrations of aluminum along with the concentrations of a few other elements were measured through ICP-OES at the selected specific optical emission wavelength for the elements. While aluminum contents were within permissible limits in accordance with regulatory guidelines, notable differences were observed among the samples. Deodorants #1 and #2 were found to possess less than 0.1 ppm aluminum, while Deodorant #3 contained over 122 ppm aluminum. These findings underscore the significance of meticulous monitoring of elemental composition during deodorant production as well as consumer awareness of ingredient labeling in order to mitigate potential health concerns.

To ensure ultimate consumer well-being, continuing research efforts to further assess the safety profiles of deodorants and refine manufacturing practices are warranted. ICP-OES tehnicque is capable of reliably discerning concentrations of elements to a high degree of certainty and thus provides a dependable measure for deororant quality control. Similarly, ICP-OES could be very useful in quantifying the elemental compositions of many other health, beauty, food, and pharmaceutical products where trace elements and ingridents are of significance.

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