

CENTRUL UNIVERSITAR NORD DIN BAI A MARE  
Facultatea de Inginerie

*NORTH UNIVERSITY CENTRE OF BAI A MARE  
Faculty of Engineering*

**BULETIN ȘTIINȚIFIC**

**AL CENTRULUI UNIVERSITAR NORD DIN BAI A MARE**

SERIA D

Exploatări Miniere

Prepararea Substanțelor Minerale Utile

Metalurgie Neferoasă

Geologie și Ingineria Mediului

Volumul XXXVIII Nr. 2

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*Mineral Processing*

*Non-ferrous Metallurgy*

*Geology and Environmental Engineering*

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1. Papers must be written in English, Microsoft Word and will not exceed 12 pages.
2. Paper includes: title, authors, institution, abstract, keywords, paper content, conclusions and references.
3. Page dimensions A4, top 2cm, down 2cm, left 2,5cm, and right 2cm.  
Times New Roman font, single spacing.
4. Paper's title will be written with capital letters 14pts, bold, centered. Authors will be written with 12pts, bold, italic, centered. Affiliation will be written with 12pts, italic, centered. Abstract and keywords with 10pts, italic, justify. After title, affiliation, abstract, keywords leave one line space. Before and after each subtitle leave one line space. Paper text will be written with 12pts, justify, figures/tables included in the text. References will be listed with 10pts.

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## **STUDIES AND RESEARCH ON THE MEASUREMENT AND VERIFICATION OF PARTS OBTAINED IN THE AERONAUTICAL INDUSTRY**

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**Abstract:** *This paper presents studies and research on micron precision measurements of aircraft structural components and assemblies at Universal Alloy Corporation Europe Dumbrăvița, Maramureș County (UACE). The results and conclusions are presented, highlighting the advantages and disadvantages currently practiced in the assembly of aeronautical structures.*

**Keywords:** *Computer Aided Design (CAD), accuracy inspection, coordinate measuring machine (CMM)*

## **ASSESSMENT OF STREET NOISE POLLUTION IN THE SASAR AND Garii NEIGHBORHOODS, BAIa MARE, MARAMURES COUNTY, ROMANIA**

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### **Abstract**

*The present study assesses the level of noise pollution associated with road traffic in two neighborhoods, Sasar and Garii, within the Baia Mare municipality. Noise levels were measured over two months (April and May) at ten different points (five in each neighborhood) and presented as monthly average values for day, evening, and night intervals. Although the average monthly noise levels for streets categorized I, II, and III did not exceed the maximum allowable values for day and night, there were 30 cases of momentary exceedances on Categories I and II streets. Specifically, 36.67% of these exceedances occurred between 7-12, 26.66% between 12-19, and 36.67% between 19-23. The highest recorded noise level was 74.20 dB(A) at point S3 (Category I street), while the lowest was 36.80 dB(A) at points S5 and G1 (both Category III streets). Overall, the distribution of noise levels across the ten measurement points indicates good homogeneity.*

**Keywords:** *noise level, road traffic, noise pollution*

## STUDIES ON DETERMINING THE ELECTROCHEMICAL CORROSION POTENTIAL OF 7136 SERIES ALUMINUM ALLOYS

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**Summary:** *The paper presents studies conducted to determine the corrosion potential, which is established spontaneously when the aluminum alloy sample comes into contact with the corrosive medium. This mixed corrosion potential characterizes the metal ionization process, where electrons released from the reaction are reduced by other species in the corrosive medium. The sample used in the experiment is a 7136 aluminum alloy, placed in a corrosive medium of NaOH solution (pH = 12). At the corrosion potential, the anodic process rate equals the cathodic process rate. The measured T.E.M. is 1.54 V, and the corrosion potential  $E_{cor}$  is -1.304 V, indicating only the thermodynamic possibilities for corrosion reactions. Anodic polarization is measured through the overpotential value  $\eta_a$ , while cathodic polarization is determined by  $\eta_c$ . The calculated values are  $\eta_a = 0.356V$ ,  $\eta_c = -1,54 V$ . Images of the corroded surface in the alkaline solution are presented, obtained using a KRUSS stereoscopic microscope after electrochemical corrosion testing.*

**Keywords:** *Electrochemical corrosion, aluminum alloys, corrosion potential, Ag/AgCl electrode*

## **EXPLORING THE POTENTIAL OF CALCIUM AND MAGNESIUM IN NATURAL MINERAL WATERS FROM THE BAIJA MARE DEPRESSION, MARAMUREȘ**

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### **Abstract**

*Natural mineral waters represent a significant source of essential mineral macronutrients for human health, with calcium and magnesium cations standing out due to their numerous physiological benefits associated with consumption. Studies conducted on natural mineral waters from the Baia Mare Depression area reveal a notable concentration of macronutrients, ranging from several tens of mg/L for magnesium, to values exceeding 150 mg/L for calcium, indicating significant natural mineral potential.*

*This paper also synthesizes the results of analyses conducted on these mineral water sources during past decades, with data collected in the years 1959, 1970, and 1977. After 1977, comprehensive analyses of these hydromineral sources are no longer found in the specialized literature. A thorough investigation of the chemical and physical characteristics of these waters could stimulate their extended use, thereby contributing to the natural intake of trace elements beneficial to human health.*

**Keywords:** natural mineral waters, mineral macronutrients, calcium, magnesium, health

## **EDUCATIONAL INITIATIVES AT COUNTY MUSEUM OF MINERALOGY „VICTOR GORDUZA” BAIA MARE**

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### **Abstract**

*This article presents the most important activities from the Museum's Educational Program, made by the County Museum of Mineralogy „Victor Gorduza” Baia Mare, including brief descriptions of how these are carried out, the logistics used, the beneficiaries and the results achieved.*

*Through the museum education projects - fulfilling one of the basic functions of the museum, that of education - we aim to compensate for the lack of a Geology discipline (respectively Earth Sciences) in the pre-university school curriculum. Therefore, the museum specialists involved in the implementation of these projects consider it imperative to talk about what geology is, about the importance of mineral resources in the development of human society, about the minerals that make up the objects around us, about the consequences of geological phenomena on human health, biodiversity and nature in general and bring this science closer to beneficiaries of all ages.*

*The museum educational projects aim to achieve the mentioned objectives, by carrying out activities within the premises of the museum, in pre-university educational institutions, and outdoors - especially on the territory of natural protected areas, at various events dedicated to science, with activities structured on various criteria, so as to cover as wide a range of topics as possible, for the benefit of as many beneficiaries as possible.*

**Keywords:** *museum educational projects, geology, uses of minerals, thematic trips, natural protected areas.*

## REMOTE SENSING FLOW DATA IN A UNESCO PROTECTED AREA

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### **Abstract:**

*Roşia Montană, a historic mining site in Romania, was inscribed as a UNESCO World Heritage Site in 2021 due to its exceptional cultural and industrial heritage. Located in the Apuseni Mountains, this area has been a center for gold and silver mining for over 2,000 years, from Roman antiquity to modern times. The site is recognized for its extensive underground mining galleries, well-preserved Roman-era works, and significant historical artifacts. This paper explores the cultural, environmental, and socio-economic dimensions of Roşia Montană, analyzing its historical significance and contemporary challenges. The impact of these projects on local communities, biodiversity, and archaeological heritage is critically examined using the GIS scientific method.*

**Keywords:** *Roşia Montană, UNESCO, mining heritage, sustainable development, cultural preservation, environmental impact, Sentinel-2, Landsat 8.*

## **STUDIES ON THE THEORY OF SLIP-LINES TO PLASTIC DEFORMATION**

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### **Abstract**

The paper presents a theoretical and experimental study regarding the evolution of slip lines during the plastic deformation of metallic materials. The slip lines theory provides a description of a structural deformation, produced by plastic distortions in narrow slip bands. Numerical experiments are in agreement with classical solutions of slip field theory as it allows the development of slip bands as the boundary conditions are varied.

**Keywords:** plastic deformation, slip lines theory

## MONITORING PARTICULATE MATTER AIR POLLUTION AT ROAD INTERSECTIONS IN BAIJA MARE MUNICIPALITY, MARAMURES COUNTY, ROMANIA

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### **Abstract**

*The present study highlights  $PM_{2.5}$  and  $PM_{10}$  pollution at four significant road intersections in Baia Mare municipality. Measurements for  $PM_{2.5}$  and  $PM_{10}$  were carried out at four points in each intersection during peak traffic hours from June to August 2024. The results, represented as average values, indicated 14 exceedances of the maximum allowed value out of 16 measurements for the  $PM_{2.5}$  indicator, while the  $PM_{10}$  values were below the maximum permitted limit. The highest exceedances of the maximum allowed value for  $PM_{2.5}$  were observed at the intersection of Blvd. Independentei and Blvd. Republicii, with values ranging from 22.4 to 25.6  $\mu\text{g}/\text{m}^3$ . The lowest values were recorded at the intersection of Blvd. Regele Mihai I and Blvd. Unirii, ranging from 18.2 to 24.2  $\mu\text{g}/\text{m}^3$ . Across all four intersections, the exceedance values for  $PM_{2.5}$  were between 22  $\mu\text{g}/\text{m}^3$  and 25.6  $\mu\text{g}/\text{m}^3$ . On the other side, the measured values for the  $PM_{10}$  indicator ranged from 26.2  $\mu\text{g}/\text{m}^3$  to 42.6  $\mu\text{g}/\text{m}^3$ . The highest values were found at the intersection of Blvd. Independentei and Blvd. Republicii and the lowest values were recorded at the intersection of Blvd. Traian and Blvd. Republicii. Although the  $PM_{2.5}$  and  $PM_{10}$  indicator values at the respective intersections do not currently threaten air quality, corroborating these data with the environmental authority's reports indicates the necessity for improved monitoring to ensure the safety of the environment and human health.*

**Keywords** particulate matter, road dust, road traffic, human health, monitoring

## STUDIES ON THE ACTIVATION OF 2024 ALUMINUM ALLOY AND HIGHLIGHTING THE BEHAVIOR OF THE ACTIVATED SURFACE IN THE PRESENCE OF A $\text{CuSO}_4$ SOLUTION

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**Summary:** *The paper presents studies on the activation of 2024 series aluminum alloy using a 20% HCl solution and the behavior of the activated surface in the presence of a 0.06M  $\text{CuSO}_4$  solution. Microscopic images obtained with a KRUSS stereoscopic microscope reveal copper crystals grown on the alloy's surface, either dispersed or aligned along the extrusion direction. Crystallization nuclei correspond to the Cu-containing grains in the alloy's surface. Additionally, corrosion products such as round, white chloride crystals and dark-phase dissolutions (possibly iron-rich phases) are visible. The electromotive force measured using a digital multimeter is 0.59 V, and the corrosion potential  $E_{\text{cor}}$  [V] is -0.354. The calculated anodic overvoltage  $\eta_a$  is 1.306V, and the cathodic overvoltage  $\eta_c$  is -0.118 V. Cathodic coatings, where the deposited metal has a more electropositive electrochemical potential than the base metal, can form electrochemically or chemically. After 22 hours in  $\text{CuSO}_4$  solution, the Cu ion concentration was 4.63 mg/L, determined using the HI83395 device.*

**Keywords:** *Electrochemical Corrosion, Aluminum Alloys, Activated Surface, Surface Analysis*



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