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TITLE: Refractory Properties of Alluvial Clay in the Niger Delta Region of Nigeria

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Type of Activity: Research work

Bayelsa State, located in the central Niger Delta region of Nigeria is known to have abundant clay deposits. These clay deposits remain largely uncharacterized. In this study, alluvial clay deposits found along the banks of two major tributaries of the Niger River – Orashi and Nun rivers - were characterized for physico-chemical and mineralogical properties. The objective is to determine their suitability for application as refractories which are used as insulators in the Electric Power grid.

X-Ray Fluorescence (XRF) and Atomic Absorption Spectrometry (AAS) analyses showed that the mineralogical content of the clays are largely silica (SiO_2) - 54.62% and alumina (Al_2O_3) – 32.42% with some additions of iron oxide (Fe_2O_3) – 6.05% and alkaline earth oxides [potassium oxide (K_2O) - 2.23%, magnesium oxide (MgO) – 1.85% and calcium oxide (CaO) – 1.02%].

Physical property tests carried out following ASTM standards included particle size distribution, plasticity, bulk density, thermal shock resistance and thermal conductivity. Clay samples fired up to 1,200^{o}C in an electric furnace showed that they are structurally stable with only minor changes in chemical composition.

The physico-chemical properties of the clay samples indicated that they of the Kaolinite group with a high melting point (> 1,200^{o}C) and high plasticity which make them suitable for refractory applications.

Recent Publications

1. Lawson-Jack, S. G., (2017). A Review of Electron Beam Analytical Techniques in Materials Characterization. Nigeria Journal of Materials Science and Engineering (NJMSE), Vol 5, 7-19.

2. Lawson-Jack, S. G., Flower, H. M., West, D. R. F., (1993). Constitution of Al-rich alloys of the Al-Cu-Mg-Li system. Materials Science and. Technology, Vol. 9 (7), 562 -571. http://www.ingentaconnect.com/content/maney/mst/1993/00000009/00000007/art00003

3. Brown, P. D., Loginov, Y. Y., Durose, K., Mullins, J. T., Tagushi, T., Burbery, T., Lawson-Jack, S., and Jones, I. (1992). Microstructural properties of CdS, (Cd,Zn)S and CdS//(Cd,Zn)S Superlattices; J. Crystal Growth, Vol.117 (1-4), 536-542. http://www.sciencedirect.com/science/article/pii/002202489290809W

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5. Lawson-Jack, S. G., Flower, H. M., and West, D. R. F., (1992). The characterization of 2nd-phases in Al-Li based quaternary alloys. Metals and Materials, Vol. 8, (5), 95-103. http://www.springer.com/materials/special+types/journal/12540

Biography



Dr. Sepribo George Lawson-Jack obtained a Bachelor's degree in Physics from Ahmadu Bello University, Zaria, Nigeria, a Masters degree in Nuclear Engineering from the University of London, United Kingdom and a PhD in Materials Engineering from Imperial College, London, United Kingdom. He did postdoctoral work at the School of Metallurgy and Materials, University of Birmingham, United Kingdom. He went on to work at AT&T Bell Laboratories and later Lucent Technologies both in New Jersey, United States. He also worked at the Nigeria Atomic Energy Commission, Abuja, Nigeria. He is currently an Associate Professor of Materials Engineering at the Federal University Otuoke, Bayelsa State, Nigeria.

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