residual ash is enriched in silica and applied as a good adsorbent material for heavy metals [2]. The capture of carbon dioxide and other smoke gases from the biomass burning can be vitally achieved through hot manganese oxide at 200-250°C. The gases change the mineralogical composition of the applied manganese oxides ore as investigated by using XRD, IR and SEM-EDX analysis. The environmental impact of the process can be deduced from the significant change in the mineralogy of the manganese ore from mainly oxide forms to carbonate and halide rich phases. The ore impurities (e.g. Na, Mg, Ca, Al and F ) contribute largely in the obtained mineral phases.


Keywords: CO2-sequestration, biomass burning, manganese mineralogy.

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Voluminous bio-wastes are resulted every year from agriculture where extensive literature review the article of their acidic dissolution [1]. The presence of organic matter represent a triggering factor that controls mineral dissolution in the acid sulfate soil [2]. For implications, rice straw is very promising material in the sulfate medium of mineral processing. The dissociated biomass promotes dissolution, separation and crystallization of oxide minerals avoiding the extra cost. Under controlled boundary conditions and at room temperature, rice straw in dilute sulfate medium using sulfuric acid and manganese oxide yield saccharides and manganese sulfate crystals. Moreover, under drastic acidic conditions and biomass subjection into ilmenite sulfate process, reduced saccharide is obtained with the facility of continuous crystallization of iron sulfate off. The end-product is a cheap and chemically controlled nano-TiO2 which find many photocatalysis applications.


Keywords: Biomass, mineral processing, saccharides.

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Al/Si-ordering phenomena in sanidine megacrysts from the Eifel. Kathrin Demtröder, Sara Dehn, Michael Gopon, Jürgen Schreuer. Institut für Geologie, Mineralogie und Geophysik, Ruhr-Universität Bochum, Germany.
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Sandine megacrysts from Volkesfeld (Rieden eruptive centre, East Eifel volcanic field, Germany) are well known for their unusual optical properties [1]. Starting from 1025 K their optic axial angle 2V changes rapidly at higher temperatures. This macroscopic effect has been interpreted as being associated with a corresponding increase of the Al/Si-disorder on the atomic level. The sandines from Volkesfeld are further characterised by very low concentrations of dislocations indicating hydrothermal growth conditions [3]. However, the reason for the drastic and irreversible change of the optical properties is still under debate. To clarify the role of water and chemical composition for the observed optical anomalies, the Al/Si-ordering has been investigated in sandine megacrysts from four different eruptive centres of the Eifel and from Madagascar (served as reference) by means of single crystal X-ray diffraction, optical techniques and NMR-spectroscopic studies. The chemical composition Na$_x$K$_{1-x}$AlSi$_2$O$_8$, as obtained by electron microprobe analysis, is characterised by $x \approx 0.15$ and $x \approx 0.27$ for megacrysts from the East Eifel and West Eifel volcanic field, respectively, with up to 2 at-% celsian and less than 0.02 at-% anorthite. The H$_2$O content varies about between 250 ppm and 400 ppm.
All investigated Eifel sandines show irreversible optical anomalies at temperatures above 1073 K. Their optical axis angles 2V change drastically from about 30° in a plane perpendicular to (010) to about 35° within (010). According to [2] this corresponds to a decrease in the Al/Si order from 2t $\approx$ 0.70 to 0.58. However, tetrahedral bond distances derived from single crystal structure analyses indicate 2t $\approx$ 0.58 [4] for fresh samples and only small changes after annealing. The latter findings are supported by $^{29}$Si and $^{27}$Al NMR-experiments. Our contradictory experimental observations are probably caused by the water dissolved in the crystal structure of these nominally anhydrous minerals.


Keywords: Al/Si-ordering, sanidine megacrysts, optical anomalies.

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Core-Shell Ni$_{0.5}$TiOPO$_4$/C Composites as Anode Materials in Li Ion Batteries. Rachid Essahi, Brahim ElBalli, Zehn Zhou, Hartmut Fues, "SUBATECH, Unité Mixte de Recherche 6457, École des mines de Nantes, CNRS/IN2P3, Université de Nantes, BP 20722, 44307 Nantes cedex 3 France. "Laboratory of Mineral Solid and Analytical Chemistry “LMSAC”, Department of Chemistry, Faculty of Sciences, University Mohamed I, PO Box 624, 60000 Oujda, Morocco. "Institute of New Energy Material Chemistry, Key Laboratory of Advanced Micro/Nanomaterials and Batteries/Cells (Ministry of Education), Nankai University, Tianjin
Pure Ni$_{0.5}$TiOPO$_4$ was prepared via a traditional solid-state reaction, and then Ni$_{0.5}$TiOPO$_4$/C composites with core–shell structure were synthesized by hydrothermally treating Ni$_{0.5}$TiOPO$_4$ in glucose solution. The morphology and the microstructure were characterized by scanning electron microscopy and transmission electron microscopy. The small particles with irregular shapes were coated with uniform carbon film of ~3 nm in thickness. Raman spectroscopy also confirmed the presence of carbon in Ni$_{0.5}$TiOPO$_4$/C composites. The electrochemical performances of Ni$_{0.5}$TiOPO$_4$/C and Ni$_{0.5}$TiOPO$_4$ were compared through galvanostatic charge/discharge tests, cyclic voltammetry and electrochemical impedance spectroscopy. Ni$_{0.5}$TiOPO$_4$ composites exhibited improved electrochemical performances due to the existence of carbon shell. During the first discharge, the NTP/C electrode delivered a capacity of 530 mAh/g. The redox couples of Ti$^{4+}$/Ti$^{3+}$, Ti$^{3+}$/Ti$^{2+}$ and Ni$^{2+}$/Ni in NTP/C can involve the insertion of only 3 mol lithium atoms. However, not all lithium atoms could be extracted during the subsequent charge. The excess capacity during the first discharge should attribute to the formation of SEI passivation layer.


**Keywords:** σ-phase, X-ray diffraction, duplex steels

**FA2-MS16-P26**

Microstructure of coke deposited by a high temperature process. Sven Gerhardt, Klaus Bente, Jörg Hofmann, Reiner Staudt, Institut für Mineralogie, Kristallographie und Materialwissenschaft, University of Leipzig. Institut für Nichtklassische Chemie, University of Leipzig. E-mail: sven.gerhardt@uni-leipzig.de

It is well known that metal dusting is an undesirable corrosion phenomenon that can be observed in a wide range of chemically and petrochemically working industries. Due to strongly carburizing atmospheres, it leads to a decomposition of materials into metal particles and carbon. The aim of this work is to clarify open questions by identifying and modeling fundamental correlations between vapour-solid reactions and their consequences for microstructure, surface morphology and catalytic behaviour of the metal. The high temperature grown coke coating and metal pipe were inspected by 3D X-ray tomography (volume properties), XRD (existing phases), XPS (chemical bonding), HRTEM (nanostructures), SEM (surface morphology), electron microprobe analysis and TEM-EDX (chemical composition).

**Keywords:** transmission electron microscopy, X-Ray tomography, coke

**FA2-MS16-P27**

Mullite-type (Bi$_2$Si$_2$O$_7$)$_2$Al$_2$O$_3$: HT-XRPD, TEM and XPS investigations. Thorsten M. Gesing, Marco Schowalter, Claudia Weidenthaler, Andreas