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Estimation of degree of liberation in a coarse crushed product of cobalt-rich ferromanganese crust/nodules and its gravity separation

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INTERNATIONAL JOURNAL OF MINERAL PROCESSING, [ELSEVIER SCIENCE BV, AMSTERDAM], Jul, 2008, Vol. 87, pp. 100-105.

Cobalt-rich ferromanganese crust and nodule ores from seamount areas contain volcanic and sedimentary rocks as substrate or nuclei. During mining operations, these rocks should be separated as unfavorable waste rocks with the ferromanganese minerals. The cobalt-rich ferromanganese crust and nodule ores require mineral processing to remove the substrate/nuclei rock before the smelting. Deep-sea manganese nodule ores in contrast contain vanishingly small rocks, and can be directly treated with a metallurgical process without mineral processing treatment. This study is a physical and chemical description of the ores for the purpose of mineral processing, and reports estimates of the degree of liberation in a coarse crushed product of ores and its gravity separation results. From the obtained results a process flow-sheet for the beneficiation of cobalt-rich ferromanganese crust and nodules is proposed.
DOI: 10.1016/j.minpro.2008.02.005

Beneficiation of pulverized coal combustion fly ash in fluidised bed reactors

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EXPERIMENTAL THERMAL AND FLUID SCIENCE, 5th Mediterranean Combustion Symposium, SEP 09-13, 2007, Lisbon, PORTUGAL, [ELSEVIER SCIENCE INC, NEW YORK], JUL, 2008, Vol. 32(7), pp.1324-1333.

The paper addresses the thermal treatment of pulverized coal combustion fly ash belonging to the group C of Geldart powder classification in unconventional configurations of fluidised bed reactors. A sound-assisted fluidised bed combustor operated at 850 and 750 degrees C, and a fluidised bed combustor characterized by a

conical geometry, operated at 850 degrees C, are the two lab-scale reactors tested. Combustion experiments have been carried out at different air excesses, ranging between 10% and 170%, and in the case of the conical fluidization column with different bed inventory. Both tested configurations have been proved to be efficient to reduce the carbon content initially present in the fly ash of 11%(w), to a very low level, generally smaller than 1%(w). Both the fly ash residence time in the reactor and the air excess strongly influenced the reactor performance. Residence times of 3-4 min and 10-60 min have been estimated for experiments carried out with the sound-assisted fluidised bed combustor and with the conical fluidised bed combustor, respectively. Regarding the possibility of a concurrent reduction of unburned carbon in the ash and of a particle size separation of the beneficiated material, on the basis of the obtained experimental data, the sound-assisted fluidised bed combustor is not able to separate the broad particle size distribution of the fly ash in different outlet solid streams. The use of a conical fluidised bed combustor is promising to realize an efficient separation of the inlet broad particle size distribution of the fly ash fed to the reactor into narrower outlet solid streams extracted from different locations: combustor exit, top and bottom of the bed. In this framework a hydrodynamic characterization of binary mixtures in a conical fluidised bed column carried out at ambient and high temperature (850 degrees C) has demonstrated that the operating conditions of the conical fluidised bed combustor can be chosen on the basis of a compromise between the requirements of a complete fluidization of the bed material and a high level of segregation of the finer particles present in the bed.
DOI: 10.1016/j.expthermflusci.2007.11.005

Materials Selection for Bitumen with Heavy Naphthenic Acid in Canadian Oil Sands

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PROCEEDINGS OF THE EIGHTEENTH (2008) INTERNATIONAL OFFSHORE AND POLAR ENGINEERING CONFERENCE, VOL 1, 18th International Offshore and Polar Engineering Conference (ISOPE 2008)
JUL 06-11, 2008, Vancouver, CANADA, [INTERNATIONAL SOCIETY OFFSHORE& POLAR ENGINEERS, CUPERTINO], 2008, pp. 21-30.

Canada's oil sands contain one of the largest reserves of oil in the world. According to recent estimates, there are nearly 180 billion barrels of oil in the Canadian oil sands trapped in a complex mixture of sand, water and clay. More than 40 companies have been currently operating or developing oil sands facilities since the first production in 1967. Current oil production from the oils sands is approximately I million barrels per day with 3 million barrels per day forecast by 2015. The produced bitumen requires upgrading before it can be fed into conventional refineries due to undesirable octane value, sulfur contents, chloride contents, coke, other impurities, and heavy viscosity. The process of oil sands upgrading is similar with downstream refinery, but the corrosion environment in upgrading refinery is often more severe than in the refinery because of high chlorides, mineral contents, carbonic acid, heavy viscosity and fouling,

higher naphthenic acid [NA-R(CH2)nCOOH], and greater sulfur contents. Naphthenic acid corrosion (NAC) which is one of the most critical corrosion issues in up & downstream refinery plants was observed for the first time in 1920's in refinery distillation processes of Rumania, Azerbaizan (Baku), Venezuela, and California. As a first API report, the 11th annual meeting stated sources and mechanism of NAC in early 1930's. API has been developing the risk base standards, such as API RP580, 57 1, and Publication 581 which are based on the worst NAC damage in the world since 2000. Nevertheless not only the NAC phenomena and control in Canadian sands oil process are not much widely known but also there are still no engineering guidances for the Canadian sands oil in API standards. This paper will give NAC phenomina and materials selection guidance against NA environment in Canadian oil sands upgrading processes.

Acoustic barriers obtained from industrial wastes

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CHEMOSPHERE, [PERGAMON-ELSEVIER SCIENCE LTD, OXFORD], JUL, 2008, Vol. 72(7), pp. 1098-1102.

Acoustic pollution is an environmental problem that is becoming increasingly more important in our society. Likewise, the accumulation of generated waste and the need for waste management are also becoming more and more pressing. In this study we describe a new material-called PROUSO-obtained from industrial wastes. PROUSO has a variety of commercial and engineering, as well as building, applications. The main raw materials used for this environmentally friendly material come from slag from the aluminium recycling process, dust from the marble industry, foundry sands, and recycled expanded polystyrene from recycled packaging. Some natural materials, such as plastic clays, are also used. To obtain PROUSO we used a conventional ceramic process, forming new mineral phases and incorporating polluted elements into the structure. Its physical properties make PROUSO an excellent acoustic and thermal insulation material. It absorbs 95% of the sound in the frequency band of the 500 Hz. Its compressive strength makes it ideal for use in ceramic wall building.
DOI: 10.1016/j.chemosphere.2008.03.039

Modelling and optimization of hydrocyclone for iron ore fines beneficiation - using optical image analysis and iron ore texture classification

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A new modelling technique for simulating hydrocyclone performance has been developed, in which particles in every size fraction of the feed ore are classified based on ore texture type, taking into account that the same ore texture types in every size fraction of the feed ore have similar mineral contents and densities. Mineral tracking by optical image analysis and newly-developed texture classification software was used in this technique to classify the feed ore particles by texture type and to determine the average particle density of each class in every size fraction. Particle density calculations took into account the reduction of porosity with reduction of particle size and the effect of different imaging magnifications for different size fractions. The data obtained about each class in every size fraction was used to create a virtual feed which was input to the hydrocyclone model to simulate the ore processing performance. For model validation, pilot-scale hydrocyclone beneficiation experiments were performed on an iron ore blend, using different hydrocyclone pressures and percent solids in the feed pulp. Model parameters were determined from one set of experimental results and the calibrated model was then used to predict the outcomes of the two subsequent experiments. Comparisons of the model and experimental results are presented and discussed. This new approach enables prediction of the recovery of each mineral and texture type in the products, calculation of the total product iron grade and recovery, and optimisation of the hydrocyclone performance for a given ore.
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Mineralogical features of size and density fractions in Sasol coal gasification ash, South Africa and potential by-products

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FUEL, [ELSEVIER SCI LTD, OXFORD], JUL, 2008, Vol. 87, pp. 1439-1445.

Bulk gasification ash (a mixture of coarse and fine ash particles), a by-product of coal gasification, is formed at elevated temperatures and pressures by the interaction of included minerals present in the coal and "stone". From the detailed mineralogical and chemical analyses of the pulverised screened size fractions and one density float fraction (<1.9 g/cm(3)) a number of potential viable by-products were identified. Screening and density separation produced a high ash, low volatile carbon-rich by-product, which is potentially suitable as an energy source for the cement industry. In addition, this carbon-rich product has included devolatilised kaolinite and quartz that are a source of Al2O3 and SiO2.

This product could potentially replace the amount of clay required in the cement process. This high ash carbon product is not suitable as a reductant in the metallurgical industry. The -38 + 20 mu m ash size fraction is characterised by a comparatively high proportion of aluminosilicate (transformed product of kaolinite) and Ca-oxide/CaMg-oxide (transformed product of calcite/dolomite). These phases will enhance the

pozzolanic reactivity of this ash size fraction and provide material suitable for the cement/concrete industry. The coarse ash size fractions are used as aggregate in road construction and in the manufacture of bricks. If economically and technically feasible, anorthite in the coarse ash size fractions could be beneficiated and used in a refractory.
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Mineral comminution: Energy efficiency considerations

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MINERALS ENGINEERING, [PERGAMON-ELSEVIER SCIENCE LTD, OXFORD], JUL, 2008, Vol. 21(8),
pp. 613-620.

The energy efficiency of comminution processes is very low based on the energy required to generate new fracture surface area relative to the mechanical (strain) energy input. However, the maximum ideal limiting efficiency E-Limit, against which actual efficiencies may be compared is unknown. Therefore, theoretical analyses were undertaken to determine E-Limit for a compressive loading comminution machine based on the stress state in a single particle containing a central crack (flaw). The analyses show that E-Limit increases with increasing Poisson's ratio nu, having values of similar to 5%, similar to 7.5% and similar to 9% at nu similar to 0, similar to 0.2 and similar to 0.39, respectively. Actual energy efficiencies, E-B, expressed in terms of the energy required to create new fracture surface area relative to the work input, using standard Bond work index values, are lower in the range <1% to similar to 2%. The relative efficiency ratio E-B/E-Limit varies from similar to 3% to similar to 26%, depending on the mineral, and is considered to be a more useful (practical) measure of efficiency because it gives a better assessment of behaviour relative to the limiting situation. It is concluded from the EB/E-Limit ratios that the potential exists to improve comminution efficiencies by two or three times. Possible methods of achieving this are discussed. (C) 2007 Elsevier Ltd. All rights reserved.
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Pore water chemistry of acid sulfate soils: Chemical flux and oxidation rates

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GEODERMA, [ELSEVIER SCIENCE BV, AMSTERDAM], Jul, 2008, Vol. 146, pp. 32-39.

Peeper pore water profiles above the oxidation front in acid sulfate soils (ASS) revealed unexpected differences in the elevation of the concentration maxima for chemical element species. These reflect the differing chemical and transport processes occurring

in the oxic soil above, and the anoxic zone below, the oxidation front. Transport below the oxidation front is diffusive and by using the measured profiles of dissolved Li, liberated by acid hydrolysis of clays, it is possible to assess the period over which oxidation has occurred at this site. This time, ca 60 years, is consistent with the initial engineered drainage of the site ca. 100 years. But this current diffusion process may also be superimposed on earlier weather-driven oxidation events. It is estimated that 78-90 tonnes of H(2)SO(4)/ha have been exported from the McLeod's Creek catchment. The pore water profiles of "background" species, namely Cl, Na, K, Mg and Sr, increased monotonically with decreasing elevation in the ASS profile, suggesting upward diffusion, from estuarine-formation pore waters at lower elevations in the profile, towards fresher surface waters. Ion ratios of "background" species relative to chloride reveal sources of these species close to the oxidation front, as expected from acid hydrolysis of clays. Ion ratios also showed depletion of K above the oxidation front. The relative concentration of "background-corrected" Na, Ca, and Mg at the oxidation front suggests that smectite is the major clay mineral in the oxic soils. The monotonic profile of Cl reveals an upward diffusion. The overall Cl flux is calculated as 660 kg/ha/y, implying a time scale of exposure of these soils to fresh surface waters of 2000 years.

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Acoustic barriers obtained from industrial wastes

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CHEMOSPHERE, [PERGAMON-ELSEVIER SCIENCE LTD, OXFORD], JUL, 2008, Vol. 72(7), pp. 1098-1102.

Acoustic pollution is an environmental problem that is becoming increasingly more important in our society. Likewise, the accumulation of generated waste and the need for waste management are also becoming more and more pressing. In this study we describe a new material-called PROUSO-obtained from industrial wastes. PROUSO has a variety of commercial and engineering, as well as building, applications. The main raw materials used for this environmentally friendly material come from slag from the aluminium recycling process, dust from the marble industry, foundry sands, and recycled expanded polystyrene from recycled packaging. Some natural materials, such as plastic clays, are also used. To obtain PROUSO we used a conventional ceramic process, forming new mineral phases and incorporating polluted elements into the structure. Its physical properties make PROUSO an excellent acoustic and thermal insulation material. It absorbs 95% of the sound in the frequency band of the 500 Hz. Its compressive strength makes it ideal for use in ceramic wall building. (C) 2008 Elsevier Ltd. All rights reserved.
DOI: 10.1016/j.chemosphere.2008.03.039

A geostatistically based preprocessing algorithm for hyperspectral data analysis

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GISCIENCE & REMOTE SENSING, [Bellwether Publ Columbia], Jul-Sep, 2008, Vol. 45(3), pp. 356-368.

We present a preprocessing algorithm for hyperspectral remote sensing datasets. The algorithm is based on a geostatistical method and should be helpful when a spatial relationship is detected in a dataset. One significant advantage of hyperspectral remote sensing using spectral profiles is the ability to compare an unknown pixel's profile with endmembers that have already been identified by a variety of methods (e.g., laboratory experiments with high-precision spectrometers), with the final goal of determining the unknown pixel. The conditions under which the airborne or spaceborne hyperspectral data arc collected, however, differ from those that prevail in the laboratory or field. Therefore, a dataset should be pre-processed so as to eliminate or considerably reduce these differences; the algorithm presented here could be used for that purpose. The result will not only improve the smoothness of spectral profiles, but it may also offer advantages for geological investigations to study mineral anomalies Using hyperspectral data. Concentrations of minerals in rock bodies often have certain patterns and follow trends that can be modeled by computing a semivariogram. The advantages Of using such a trend have induced mining engineers to develop innovations in geostatistics. These trends Should be taken into account when handling hyperspectral datasets. In all methods presented for boosting spectral profiles, the spatial relationships among pixels' DNs are neglected, but, in the method presented here, this relationship is calculated by geostatistics, and in algorithm is applied to improve spectral profiles. The nugget effect is calculated separately for each channel, and its square root is Subtracted from the reflectance of all pixels in that channel. Finally, we examine the effectiveness and validation of the method examined using the AVIRIS dataset from Cuprite, Nevada. The results are satisfactory, as the algorithm yields a better mineral detection process.
DOI: 10.2747/1548-1603.45.3.356

Separation Processes-Solvent Extraction/ion Exchange for Metalions.

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In: Training Course on Mineral Processing and Nonferrous Extractive Metallurgy, June 30 - July 5, 2008, Jamshedpur.

In the hydrometallurgical processing of complex ores/ concentrates/ secondaries/ wastes, the solutions contain-ing different non-ferrous metals are obtained during teaching the materials in acidic, ammoniacal or alkaline lixiviants. The spent solutions and effluents are also generated in different process industries and contain metallic values. Their discharge in the sewage or river is major concern for environment.. In

order to meet the strict environmental regulation and conserve the natural resources, metallic values are to be recovered. The leach solutions, spent solution and effluents are usually proc-essed to recover metallic values following precipitation, solvent extraction, ion exchange, electrolysis, evaporat-ion, crystallization, electrodialysis etc. Solvent extrac-tion (SX) is one such proven technique in the hydromet-allurgical processing for selective extraction and sepa-ration of metals due to the ease of applicability, versa-tility and ability to produce high value products. It is used on commercial scale for the recovery of different metals from different solutions viz. copper, nickel, cobalt, zinc, tungsten molybdenum, uranium, rare earths etc. The effluents from waste streams are also processed to recover metals using organic extractants. With the development of improved design of SX equipment and mate-rial of construction and newer organic extractants, it is possible to recover metals as value added products even from the complex solutions containing various ionic species. The process has been used first time in USA for nuclear application for extraction of uranium from nitrate solution using ether. Subsequently, developments were made for efficient extraction of uranium from other complex solutions.
http://eprints.nmlindia.org/5897/

Cnidarians biomineral in tissue engineering: A review

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MARINE BIOTECHNOLOGY, [SPRINGER, NEW YORK], JUL, 2008, Vol. 10(4), pp.343-349.

Biomineralization is the process by which organisms precipitate minerals. Crystals formed in this way are exploited by the organisms for a variety of purposes, including mechanical support and protection of soft tissue. Skeletal precipitation, via millions of years of evolution, has produced a wide variety of architectural configurations and material properties. It is exactly these properties that now attract the attention of researchers searching for new materials for a variety of biomedical applications.
DOI: 10.1007/s10126-008-9103-z

Molecular specifications of a mineral modulation sequence derived from the aragonite-promoting protein n16

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BIOMACROMOLECULES, [AMER CHEMICAL SOC, WASHINGTON], JUL, 2008, Vol. 9(7), pp. 1909-1918.

In the nacre layer of the mollusk, proteins play an important role in regulating the morphology and lattice structure of calcium carbonate minerals. However, this process remains elusive due to the fact that we do not understand how protein sequences

control the structure and morphology of biominerals. To take us a step further in this direction, we report the molecular structure of a 30 AA N-terminal mineral interactive sequence (n16N) of the aragonite-promoting protein, n16, and contrast these findings to those previously reported for two "calcite-blocker" nacre-associated sequences, AP7N and AP24N. We find that n16N is conformationally labile and adopts a random-coil conformation that possesses short, dispersed extended beta-strand segments that are located at the A1-Y2, K5-Y9, Y11-114, and D21-N25 sequence blocks. Like AP7N and AP24N, Ca(II) ion interactions with n16N alter chain dynamics and local structure, and n16N is adsorbed onto calcite crystals and cannot easily be displaced via differential washing techniques. Furthermore, all three sequences have planar surface regions that could serve as putative sites for mineral interactions or ion cluster formation. However, what sets n16N apart from AP7N and AP24N are different folding propensities as well as unique molecular surface features and amino acid composition. n16N has a more condensed structure that, in the presence of TFE, folds into a beta-strand. This contrasts with the more open structures of AP7N and AP24N that are induced by TFE to fold into alpha-helices. Mapping of the n16N molecular surface reveals significant cationic regions and diffuse anionic charge, which contrasts with the small anionic "pocket" regions of AP7N/AP24N. Finally, n16N has 50% fewer sites for mineral surface- or ion cluster-associated water interactions compared to AP7N and AP24N. Overall, the structure of n16N is "tuned" to a different function within the in vitro mineralization scheme. The different features found in AP7N, AP24N, and n16N could be exploited for engineering polypeptides that recognize and bind to different surface features of inorganic crystalline solids.
DOI: 10.1021/bm8001599

Study the effect of chromite ore properties on pelletisation process

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INTERNATIONAL JOURNAL OF MINERAL PROCESSING, [ELSEVIER SCIENCE BV, AMSTERDAM], Aug, 2008, Vol. 88, pp. 13-17.

Chrome ore properties play a critical role in various pelletisation subprocesses (grinding, filtering. pelletisation and sintering) and slight variation in ore properties significantly affect the whole pelletisation process. Three ore samples (sample-A, B and C) were collected from different working faces of a chromite ore mine. Experiments were carried out to find out the difference in grinding (Inherent ore granulometry, ore hardness, ore grindability and friability), pelletisation (green pellet strength, balling time and pellet size) and sintering (pellet strength and porosity) characteristics of these ore samples. Chemical analysis and microscopic studies of the ore samples and pellets were also carried out to identify the cause of difference in pelletisation characteristics of ore samples. These differences were mainly caused by ore genesis process, degree of weathering and mining method. Results of the study show that the ores collected from different working faces of a mine show the significant difference to unstabilize the process with degraded product quality. It was found that blending could be a suitable

option to tailor the desired grade feed for steady process efficiency and product quality with proper natural resource utilization.
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The effect of heat treatment on the magnetic properties of pyrite

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The effect of thermal treatment on the magnetic properties of pyrite was investigated. Untreated pyrite showed evidence of both Paramagnetic and ferromagnetic components. After heat treatment, the saturation magnetisation increased considerably until 800 degrees C when the magnetisation decreased, and then increased again after 900 degrees C. These changes are due to phase changes induced by oxidation. The wet magnetic recovery of the untreated sample was 25%, which increased to over 90% after treatment at 500 degrees C. The recovery of the magnetic fraction plateaus after treatment at higher temperatures, implying that a sample magnetisation greater than 5 kA m(-1) leads to a recovery greater than 90% for this size fraction. (C) 2008 Elsevier Ltd. All rights reserved.
DOI: 10.1016/j.mineng.2008.01.008

The effects of particle concentration and charge exchange on fly ash beneficiation with pneumatic triboelectrostatic separation

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SEPARATION AND PURIFICATION TECHNOLOGY, [ELSEVIER SCIENCE BV, AMSTERDAM], AUG, 2008, Vol. 62(1), pp. 240-248.

Pneumatic transport, triboelectrostatic separation is a well-known technique for separating unburned carbon from coal combustion fly ashes to create ash products useful as pozzolanic additives in cement. Although considerable fundamental insight has been gained about particle interactions and charging during carbon-ash beneficiation, little work has been done to examine how particle concentration in the ash transport charging line, and how tribocharged particles colliding with electrodes and causing particle charge reversal, relate to carbon-ash separation performance. We show ash-carbon separation performance diminishes with increasing particle concentrations, especially for carbon-rich fly ashes, and exhibits a maximum related to the electric field strength. On the basis of this investigation, an improved separator geometry was established that helps to overcome the limits imposed by charge reversal. (C) 2008 Elsevier B.V. All rights reserved.
DOI: 10.1016/j.seppur.2008.01.031

Vibration Mills in the Manufacturing Technology of Slurry Fuel from Unbeneficiated Coal Sludge

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SOLID FUEL CHEMISTRY, [ALLERTON PRESS INC, NEW YORK], AUG, 2008, Vol. 42(4), pp. 208-212.

Coal-water slurry fuel (CWSF) is economically viable provided that its ash content does not exceed 30% and the amount water in the fuel is at most 45%. Two impoundments were revealed that have considerable reserves of waste coal useful for commercial manufacture of CWSF without the beneficiation step. One of the CWSF manufacture steps is the comminution of coal sludge to have a particle size required by the combustion conditions. Vibration mills, which are more compact and energy-intensive that drum mills, can be used in the CWSG manufacture process. The rheological characteristics of CWSF obtained from unbeneficiated waste coal were determined.
DOI: 10.3103/S0361521908040046

Wound healing dressings and drug delivery systems: A review

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JOURNAL OF PHARMACEUTICAL SCIENCES, [JOHN WILEY & SONS INC, HOBOKEN], AUG, 2008, Vol. 97(8), pp. 2892-2923.

The variety of wound types has resulted in a wide range of wound dressings with new products frequently introduced to target different aspects of the wound healing process. The ideal dressing should achieve rapid healing at reasonable cost with minimal inconvenience to the patient. This article offers a review of the common wound management dressings and emerging technologies for achieving improved wound healing. It also reviews many of the dressings and novel polymers used for the delivery of drugs to acute, chronic and other types of wound. These include hydrocolloids, alginates, hydrogels, polyurethane, collagen, chitosan, pectin and hyaluronic acid. There is also a brief section on the use of biological polymers as tissue engineered scaffolds and skin grafts. Pharmacological agents such as antibiotics, vitamins, minerals, growth factors and other wound healing accelerators that take active part in the healing process are discussed. Direct delivery of these agents to the wound site is desirable, particularly when systemic delivery could cause organ damage due to toxicological concerns associated with the preferred agents. This review concerns the requirement for formulations with improved properties for effective and accurate delivery of the required therapeutic agents. General formulation approaches towards achieving optimum physical properties and controlled delivery characteristics for an active wound

healing dosage form are also considered briefly. (C) 2007 Wiley-Liss, Inc. and the American Pharmacists Association.
DOI: 10.1002/jps.21210

Long-term oxygen depletion from infiltrating groundwaters: Model development and application to intra-glaciation and glaciation conditions

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Processes that control the redox conditions in deep groundwaters have been studied. The understanding of such processes in a long-term perspective is important for the safety assessment of a deep geological repository for high-level nuclear waste. An oxidising environment at the depth of the repository would increase the solubility and mobility of many radionuclides, and increase the potential risk for radioactive contamination at the ground surface. Proposed repository concepts also include engineered barriers such as copper canisters, the corrosion of which increases considerably in an oxidising environment compared to prevailing reducing conditions. Swedish granitic rocks are typically relatively sparsely fractured and are best treated as a dual-porosity medium with fast flowing channels through fractures in the rock with a surrounding porous matrix, the pores of which are accessible from the fracture by diffusive transport. Highly simplified problems have been explored with the aim to gain understanding of the underlying transport processes, thermodynamics and chemical reaction kinetics. The degree of complexity is increased successively, and mechanisms and processes identified as of key importance are included in a model framework. For highly complex models, analytical expressions are riot fully capable of describing the processes involved, and in such cases the solutions are obtained by numerical calculations. Deep in the rock the main source for reducing capacity is identified as reducing minerals. Such minerals are found inside the porous rock matrix and as infill particles or coatings in fractures in the rock. The model formulation also allows for different flow modes such as flow along discrete fractures in sparsely fractured rocks and along flowpaths in a fracture network. The scavenging of oxygen is exemplified for these cases as well as for more comprehensive applications, including glaciation considerations. Results show that chemical reaction kinetics control the scavenging of oxygen during a relatively short time with respect to the lifetime of the repository. For longer times the scavenging of oxygen is controlled by transport processes in the porous rock matrix. The penetration depth of oxygen along the flowpath depends largely on the hydraulic properties, which may vary significantly between different locations and situations. The results indicate that oxygen, in the absence of easily degradable organic matter, may reach long distances along a flow path during the life-time of the repository (hundreds to thousands of metres in a million years depending on e.g. hydraulic properties of the flow path and the availability of reducing capacity). However, large uncertainties regarding key input parameters exist leading to the conclusion that the

results from the model must be treated with caution pending more accurate and validated data. Ongoing and planned experiments are expected to reduce these uncertainties, which are required in order to make more reliable predictions for a safety assessment of a nuclear waste repository.
DOI: 10.1016/j.jconhyd.2008.05.010

Development-strategy research on comprehensive exploitation and utilization of coal mine resources

Ren, RC; Li, CX; Dong, QG
3RD INTERNATIONAL SYMPOSIUM ON MODERN MINING & SAFETY TECHNOLOGY PROCEEDINGS
3rd International Symposium on Modern Mining and Safety Technology, AUG 04-06, 2008, Fuxin, PEOPLES R CHINA, [COAL INDUSTRY PUBL HOUSE, BEIJING], 2008, pp. 131-137.

The mineral resource comprehensive utilization is an important topic of mining industry development in our country, it involves various fields of minerals development, is an important manifestation and practical work of the scientific development, the energy conservation and emissions reduction, construction of resource-saving and environment-friendly society. Comprehensive utilization of the mineral processing engineering and the correlated technology has provided various methods for the comprehensive utilization of coal resources. By the overall planning, recycling waste and the clear technical line, their products involve various fields of national economy and have the good prospects for the development of the industry and market potential. Adopting the measures of the cooperation between the industry, academia and research, and forming the technological alliance and so on. Based on the tailless emission and green mining, implement 'the stage processing', realize the effective 'comprehensive utilization' of mineral resources, obtain the best economic, social and environment benefits.

Dry cleaning of Turkish coal

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ENERGY SOURCES PART A-RECOVERY UTILIZATION AND ENVIRONMENTAL EFFECTS, [TAYLOR & FRANCIS INC, PHILADELPHIA], 2008, Vol. 30(7), pp. 593-605.

This study dealt with the upgrading of two different type of Turkish coal by a dry cleaning method using a modified air table. The industrial size air table used in this study is a device for removing stones from agricultural products. This study investigates the technical and economical feasibility of the dry cleaning method which has never been applied before on coals in Turkey. The application of a dry cleaning method on Turkish coals designated for power generation without generating environmental

pollution and ensuring a stable coal quality are the main objectives of this study. The size fractions of 5-8, 3-5, and 1-3 mm of the investigated coals were used in the upgrading experiments. Satisfactory results were achieved with coal from the Soma region, whereas the upgrading results of Hsamlar coal were objectionable for the coarser size fractions. However, acceptable results were obtained for the size fraction 1-3 mm of Hsamlar coal.
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Energy considerations in compressive and impact crushing of rock

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MINERALS ENGINEERING, [PERGAMON-ELSEVIER SCIENCE LTD, OXFORD], AUG, 2008, Vol. 21(9), pp. 631-641.

A cone crusher and a vertical shaft impact (VSI) crusher were operated in closed circuit to compare the performance of the two different crushing machines. The crushers were operated in closed circuit with a 9 mm final screen aperture size. A comparison of capacity, size reduction and power draw shows that the VSI crusher is significantly more energy efficient than the cone crusher, and it produces significantly more fine material. The study also shows that the recirculating load is higher with the VSI than with the cone crusher. Compared to the cone crusher, the VSI product contained 65% more material smaller than I mm while at the same time consuming less power. An alternative energy measure was introduced to assess the value of feeding a finer product to a grinding mill. This measure suggests that a VSI can save 2-14% of the energy consumed in grinding, depending on the energy model used and the final product size. This estimate is in agreement with an energy saving of 11.8% observed in an iron ore application where VSI's were introduced as a crushing step preceding the grinding circuit.
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Froth-based modeling and control of flotation processes

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This paper illustrates a new way for modeling and control of flotation processes based on froth appearances. As shown our previous work [Liu, J., MacGregor, J.F., Duchesne, C., Bartolacci, G., 2005. Monitoring of flotation processes using multiresolutional multivariate image analysis. Minerals Engineering 18 (1), 65-76], scores of the MR-MIA features can be viewed as numerical estimates of froth status or health. Therefore, scores of the MR-MIA features can be directly used in froth control as well as in froth

modeling by employing the scores as process outputs (dependent variables). When applied to real froth images and corresponding process data, PLS regression provides good R-2 (the fraction of variance of dependent variables explained by the regression model) and Q(2) (the fraction of variance predicted for dependent variables not used in the regression model) values for both steady-state and dynamic causal models. Simulation study shows that a controller designed using the steady-state causal model provided control performances which were very satisfactory in achieving desired froth appearances.
DOI: 10.1016/j.mineng.2007.12.011

Geological Knowledge of Greeks in the Era of Trojan War

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SCIENCE AND TECHNOLOGY IN HOMERIC EPICS, International Symposium on Science and Technology in Homeric Epics, AUG 27-30, 2006, Olympia, GREECE, [SPRINGER, DORDRECHT], 2008, Vol. 6, pp. 243-255.

Among the many important historical, cultural and geographical elements found in the two Homeric epics, Iliad and Odyssey, there are many that allow the present-day geoscientist to draw indirect conclusions about the geological knowledge of the inhabitants of the Aegean and Circum-Aegean region. By the end of 19th century. K. Zeggelis. published a monograph, entitled The Science of Nature in Homer (1891), where. among others, he mentioned and commented on the poet's references on minerals (metals and non-metals), their origin and the metallurgical knowledge of the people of that era. The opinion of Zeggelis that the metallurgical processes used, although known at the time of Homer, were not performed in Greece, but in other (,probably Oriental) countries has been rejected by the newest archaeological and archaeometric studies, showing that metallurgy and smelting had begun in Greece Ion., before the Trojan war, even before the Mycenaean times. In his paper. we shall refer to the indirect conclusions to be drawn by the modern geoscientist, regarding the technical knowledge of the prehistoric Greeks. by studying drainage - anti-flooding and dams constructed in Arcadia, during the Mycenaean times. Arcadia was chosen because. as mentioned. the Arcadian king Agapeinor, son of Lycurgus, who lived in the town of Tegea, lead 6,000 Arcadians against Troy. The army was carried on 60 ships, offered by Agamemnon. In the greater area of the Arcadian Plateau, a series of basins constitute a geologically "composite" polje. These basins are: the Takka basin, the Mantineia basin, the Argon Field (Nestani plain), the Levidion - Ancient Orchomenus basin and, finally, the Kandela basin, In three out of these five basins, the prehistoric people of Minyans had constructed a series of earth dams and other drainage works, as mentioned by Pausanias. These works were studied in great detail by J. Knauss Professor of Hydraulic Engineering in Munich Polytechnic School. These works aimed at: (i) protecting great parts of the basins against flood waters coming from the surrounding mountains and the many karstic springs of the areas, thus increasing the land suitable for cultivation (land reclamation); (ii) securing irrigation water; and (iii) draining the many small swamps formed in the various plains, thus reducing the risk of

malaria. The detailed study of these works by Knauss, by a hydraulic engineer's point of view, show that Minyans were not only skilled engineers, but that they also had excellent capacity and knowledge on construction-site management, project management (very similar to the knowledge of modernday engineers), and that they were also capable of "diplomatic" interventions between cities, etc. The scientific and technological knowledge of the Minyans are comparable to those of modern in matters related to the study.

A Delineation Algorithm for Particle Images Online

Wang, WX; Wang, CZ; Hu, YZ; Liu, W
MODELLING, COMPUTATION AND OPTIMIZATION IN INFORMATION SYSTEMS AND MANAGEMENT SCIENCES, Proceedings, 2nd International Conference on Modelling, Computation and Optimization in Information Systems and Management Sciences, SEP 08-10, 2008, Metz, FRANCE, [SPRINGER-VERLAG BERLIN, BERLIN], 2008, Vol. 14, pp. 468-477.

The geometry properties of a particle are very important pieces of information for production optimization in many industrial applications such as metal material processing, sugar processing, wood piece processing, quarry, geology, mining and mineral processing, which requires that particles in images have to be delineated online. This paper shows that a method, involving image evaluation and edge based particle delineation, is a highly efficient way of delineating particles online. No earlier work on delineating particles online has exploited these two building blocks for making robust delineation. Our method has been tested experimentally for different kinds of particle images those are difficult to detect by ordinary edge detection algorithms. The reason for the powerfulness of the technique is that image evaluation and particle delineation are highly cooperative processes. As tested, the algorithms can be applied into many similar engineering areas.

Dissolution kinetics of ulexite in acetic acid solutions

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CHEMICAL ENGINEERING RESEARCH & DESIGN, [INST CHEMICAL ENGINEERS, RUGBY], SEP, 2008, Vol. 86(9A), pp. 1011-1016.

Ulexite is an important boron mineral used for the production of boron compounds. The aims of this study are to examine the dissolution kinetics of ulexite in acetic acid solutions, and to present an alternative process to produce boric acid. In order to investigate the dissolution kinetics of ulexite in acetic acid solutions, the concentration of solution, reaction temperature, solid-to-liquid ratio, and particle size were selected as experimental parameters. It was determined that the dissolution rate of ulexite increased with increasing solution concentration and temperature and decreasing

particle size and solid-to-liquid ratio. The activation energy of the process was found to be 55.8 kj/mol.
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Inorganic pigments made from the recycling of coal mine drainage treatment sludge

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JOURNAL OF ENVIRONMENTAL MANAGEMENT, [ACADEMIC PRESS LTD ELSEVIER SCIENCE LTD
LONDON], SEP, 2008, Vol. 88(4), pp. 1280-1284.

Continuous industrial development increase energy consumption and consequently, the consumption of fossil fuels. Coal mineral has been used in Brazil as a solid fuel for thermoelectric generators for several years. However, coal exploitation affects the environment intensely mainly because Brazilian coal contains excess ash and pyrite (iron disulfide). According to the local coal industry syndicate the average annual coal run per mine is 6 million ton/year: 3.5 million ton/year are rejected and disposed of in landfills. Besides pyrite, Brazilian coal contains Mn, Fe, Cu, Pb, Zn, Ge, Se, and Co. Additionally, the water used for coal beneficiation causes pyrite oxidation. forming an acid mine drainage (AMD). This drainage solubilizes the metals. transporting them into the environment, making treatment a requirement. This work deals with the use of sedimented residue from treated coal mine drainage sludge to obtain inorganic pigments that Could be used in the ceramic industry. The residue was dried ground and calcined (similar to 1250 degrees C). The calcined pigment was then micronized (D-50 similar to 2 mu m). Chemical (XRF). thermal (DTA/TG). particle size (laser), and mineralogical (XRD) analyses were carried Out Oil the residue. After calcination and micronization, mineralogical analyses (XRD) were used to determine the pigment structure at 1250 degrees C. Finally, the pigments were mixed with transparent glaze and fired in a laboratory roller kiln (1130 degrees C, 5 min). The results were promising. showing that brown colors can be obtained with pigments made by residues.
DOI: 10.1016/j.jenvman.2007.07.005

Mercury emission and its content in hard and brown coal

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GOSPODARKA SUROWCAMI MINERALNYMI-MINERAL RESOURCES MANAGEMENT, 21st World Mining Congress, SEP 07-11, 2008, Cracow, POLAND, [WYDAWNICTWO IGSMIE PAN, KRAKOW], 2008, Vol. 24(3), pp. 271-288.

Nowadays, mercury content in the environment is estimated to be two to three times higher than in the period before the industrial revolution. Three branches of industry: chlorine production by mercury method, cement production and coal combustion are the main sources of mercury emission to the air. Mercury is a natural component of coal. Combustion of coal (both hard and brown) on a mass scale in power plants, industrial plants and for communal needs, despite relatively small mercury content, contributes to significant load of mercury to the environment and presently is one of most important anthropogenic source of mercury. Mercury absorbed by human organism comes from many processes; moreover, it accumulates in organisms, so that it is hard to define emission limits for particulate sources. Thus, so far, there are not limits for mercury concentration, but in the nearest future it is planned to implement a complex strategy for this element. Such regulations, if implemented, would mostly concern coal, both hard and brown, as its combustion establishes one of the most important sources of mercury emission. As it derives from GUS (Polish Statistic Office) data, the current estimated level of emission from all sources in Poland makes ca. 20 Mg and it remains unchanged since 2002. In comparison to the relation chosen by our country, the reduction made ca. 50%. Out of the studies conducted in Poland, it derives that average content of mercury in hard coal varies between 100 and 150 ppb (micrograms per kilogram; mu g/kg), while in brown coal - from 300 to 350 ppb. It seems, that taking into consideration the form of mercury presence in Polish coal, there are possibilities for a significant decrease of mercury content on the stage of coal beneficiation.

Modulating Rice Stress Tolerance by Transcription Factors

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BIOTECHNOLOGY AND GENETIC ENGINEERING REVIEWS, VOL 25, [NOTTINGHAM UNIVERSITY PRESS
NOTTINGHAM], 2008, Vol. 25, pp. 381-403.

Plants are non-mobile organisms and have to adapt to environmental stresses mostly by modulating their growth and development in addition to physiological and biochemical changes. Transcription factors (TFs) regulate genome expression in response to environmental and physiological signals, and some of them switch on plant adaptive developmental and physiological pathways. One TF is encoded by a single gene but regulates the expression of several other genes leading to the activation of complex adaptive mechanisms and hence represents major molecular targets to genetically improve the tolerance of crop plants against different stresses. In this review an updated account of the discovery of TFs involved in biotic and abiotic stress tolerance in the model monocotyledonous plant, rice (Oryza sativa L.) is presented. We illustrate how the elucidation of the function of these TFs can be used to set up genetic engineering strategies and to rationalize molecular breeding using molecular assisted selection towards enhancement of rice tolerance to various stresses. Attempts have

also been made to provide information on the molecular mechanisms involved in stress resistance or tolerance processes. We discuss how the comparison of the action of TFs isolated from the dicotyledonous model plant Arabidopsis thaliana in rice and vice versa can contribute to determine whether common or divergent mechanisms underlie stress tolerance in the two plant species. Lastly, we discuss the necessity to discover TFs controlling specifically the root adaptive development which constitutes a major way for the plant to escape to several stresses such as water deficit or mineral nutrient deficiency.

Preparation and characterization of carbon-enriched coal fly ash

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Carbon-enriched fractions have been obtained from two coal fly ash (FA) samples. The FA came from two pulverized-coal fired power stations (Lada and Escucha. Spain) and were collected from baghouse filters. Sieving was used to obtain carbon-enriched fractions, which were further subjected to two beneficiation processes: acid demineralization using HCl and H F, and oil agglomeration using soya oil-water. Yield in weight after sieving, unburned carbon content, and several physicochemical characteristics, of the obtained fractions were used to compare the performance of the beneficiation methods. Low carbon concentration was obtained by sieving. particularly in the ease of Escucha FA. However, after acid demineralization or oil agglomeration, fractions containing unburned carbon in a rang-c of 63% to 68% were obtained. These fractions showed differences in mineral phase composition and distribution depending on the FA and oil the beneficiation method used. The textural properties of the obtained fractions varied as a function of their carbon content and the beneficiation method used. However. no significant differences in morphology of the carbonaceous particles were found (C) 2007 Elsevier Ltd. All rights reserved.
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Reuse of iron ore mineral wastes in civil engineering constructions: A case study

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RESOURCES CONSERVATION AND RECYCLING, [ELSEVIER SCIENCE BV, AMSTERDAM], SEP, 2008, Vol. 52(11), pp. 1283-1289.

To make mining activities more eco-friendly, it is important to conduct mining operations in a manner that is more environmentally friendly, economically feasible and socially acceptable. The volume of solid waste generated, including tailings from mineral processing activities, is one of the main Pollution concerns in the mining industry. in the tiny state of Goa (India), it is becoming increasingly difficult to find space for dumping

these huge volumes. And therefore ways of utilizing mine waste need to be found. This paper examines the suitability of these wastes for use in construction. Studies by others were reviewed where it Was found that these wastes contain acid producing mineral phases and high concentrations of heavy metals. The presence of such concentrations can jeopardize the environment, if management of these wastes is not addressed with Clue consideration and care. Particle size classification on these wastes suggests that mine wastes contain coarse-grained rock, sand, silt and clays. A number of tests were then conducted on the aggregate part of mine wastes and the physico-mechanical properties were obtained. According to the results obtained the mean values of uniaxial compressive strength (UCS) of concrete Cubes after 28 days of curing was found to be of the order of 21.93 and 19.91 MPa with mine aggregate and granite aggregate, respectively. Through toxicity leaching procedure tests the study also confirmed that the hydraulic binder arrests metal mobility from these wastes. This paper does not discuss the economic aspects as that was beyond the scope of the research. However, to some extent socio-economic perspective of mine waste utilization has been presented and discussed.
DOI: 10.1016/j.resconrec.2008.07.007

Use of rapeseed oil as alternative fuel in Switzerland - status report on research and practical experience From oats for draught horses to vegetable oil for the modern farm machine

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AGRICULTURAL ENGINEERING: LAND-TECHNIK 2008, Conference on Agricultural Engineering
SEP 25-26, 2008, Stuttgart Hohenheim, GERMANY, [V D I-V D E - VERLAG GMBH, DUSSELDORF], 2008, pp. 83-89.

The Rapeseed Oil Combined Heat and Power Unit' project is a public-private partnership. Its main success is the showcase presentation of the extraction of fuel-quality rapeseed oil and its failure-free application in diesel engines. Significant progress, recognised across Europe, has been made in the field of cold pressing with the setting up of the research oil mill at Suberg and the development of a process for the adsorptive removal of the decisive quality parameters phosphorus and the earth-alkali metals magnesium and calcium. The knowledge necessary for on-going operations will have been gathered by autumn 2008 in the project's own combined heat and power unit using oil from regional grown rapeseed. Extensive test bench measurements with the project engine at the University of Applied Sciences HTI in Biel, where a number of alternative fuels have been compared, showed highly favourable results for the rapeseed oil operating mode with respect to engine performance as well as to emissions, including nanoparticles. At the same time the well known fact of vegetable oils not to bee convenient for low charge or frequent idling operating modes has been confirmed. The SCR/DPF-exhaust gas treatment from Hug Engineering allowed to undercut the limits as specified in the Swiss air discharge standards. All previous results from the ongoing research in both, the static and mobile areas,

explicitly indicate this reference project to be a well qualified problem solving contribution with respect to the high demands of climate protection and improved self-sufficiency in local energy and food supply. The Swiss Federal Councils decision at the end of January 2008 to exempt ecological, biogenous fuels from mineral oil taxes has created clear conditions. It is now the role of the administration concerned to realize the unadulterated implementation, free of any possible internal agendas!

Behaviour of calcium-containing minerals in the mechanism towards in situ CO2 capture during gasification

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FUEL, [ELSEVIER SCI LTD, OXFORD], SEP, 2008, Vol. 87(12), pp. 2388-2393.

Mineral matter transformation and the behavior of mineral matter in the coal during gasification, provide more information on the suitability of a specific coal source for combustion or gasification purposes. Therefore, the chemistry and mineral interactions have to be understood in order to determine the suitability for fixed bed gasification purposes with regards to mineral matter transformations and slagging properties. Although a suite of minerals important for the gasification process were identified [Van Dyk JC, Melzer S, Sobiecki A. Mineral matter transformations during Sasol-Lurgi fixed bed dry bottom gasification - utilization of HT-XRD and FactSage modelling. Minerals Engineering 2006; 19: 1126-35], some of the minerals, i.e. anorthite and calcite, with a specific behavior at different concentrations in the mineral structure and the transformation thereof was not studied and highlighted in detail. A number of other researchers [Reifenstein AP, Kahraman H, Coin CDA, Calos NJ, Miller G, Uwins P. Behavior of selected minerals in an improved ash fusion test: quartz, potassium feldspar, sodium feldspar, kaolinite, illite, calcite, dolomite, siderite, pyrite and apatite. Fuel 1999; 78: 1449-61], [Kondratiev A, Jaks E. Predicting coal ash slag flow characteristics (viscosity model for the Al2O3-CaO-'FeO'-SiO2 system). Fuel 2001; 80: 1989-2000] and [Kondratiev A, Jak E. Applications of the coal ash slag viscosity model for the slagging gasification technologies (viscosity model in the Al2O3-CaO-'FeO'-SiO2 system), 18th Pittsburgh Coal Conference, Newcastle, Australia, December 2001]) also did not investigate these gasification changes and mineralogical deformation during specific gasification conditions in detail. The principle aim of this paper is to identify the role of Ca-containing mineral species towards the in situ capture Of CO2 during gasification, as well as understanding the chemistry and interpret the mechanism Of CO2 capture by means of high temperature X-ray diffraction (HT-XRD), in combination with FactSage modeling. The CaO content of a South African and another coal source investigated in the present study, were 6 mass% and 30 mass% respectively. The basic components present in the coal, or specifically CaO, only act as a fluxing component up to a specific percentage, where after the ash fusion temperature starts to increase again. At this turning point the (Si+Al):Ca molar mass ratio is 2.75, which implies that after the turning point, the formation of anorthite is maximized and can thereafter only remain at the same level. The anorthite formation, when the Ca content increases,

follows the inverse trend of the ash flow temperature prediction curve with the coal containing 6% CaO. The decrease in anorthite formation, with increasing Ca content, after the turning point in the graph, can be explained by the fact that more of the crystalline phase becomes a liquid (slag), and thus also the increase in the amount CaO in the slag will be observed. At the turning point, it is also interesting to note the stabilisation of the amount of other Ca-containing species. These are the minerals that are responsible and available for the mechanism where CO2 can be captured on Ca to form CaCO3. The formation of CaCO3 can also be observed from the turning point where the (Si+Al):Ca molar mass ratio is <2.75, which corresponds with the formation of other Ca-containing species. Thermodynamic modeling with FactSage results indicated that anorthite can only form to the point where the (Si+Al):Ca molar mass ratio is >2.75. Anorthite (CaSi2Al2O8) forms within the gasification zone and all non-reacted Ca react with CO2 to form CaCO3 further down in the combustion zone.
DOI: 10.1016/j.fuel.2008.03.015

Co-operation between mining regions within the Interreg IIIC Programme

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21st World Mining Congress, SEP 07-11, 2008, Cracow, POLAND, [WYDAWNICTWO IGSMIE PAN
KRAKOW], 2008, Vol. 24(3), pp. 375-388.

The following paper outlines the experience of the Faculty of Mining and Geo-engineering obtained while participating in several projects in cooperation with partners from EU member states, together with the results of the cooperation. The projects were concerned with geological and mining activity, the revitalisation of post-industrial sites and waste management. The largest portion was devoted to the project conducted under the Interreg III C initiative, namely the European Network of Mining Regions (ENMR). The purpose of this project, the enhancing of the mining sector through the creation of a network of mining regions, was evident in the article. Mining has been shown as the core link in the technological chain, providing resources vital to the development of both heavy industry and the most modem technologies, including information technology and nanotechnology which are currently so fashionable. Attention was given to the dissemination of best practice in solving technical and socio-economic problems in particular regions. The role of Poland as a strong mining state in Europe, providing positive experience to the common mineral policy, was emphasised. At present, a significant problem in many industrial regions of Europe is the change brought about by extraction and processing activities. The scale of the changes, and the problems left over from the abandonment of mines in the past, as well as the complexity of the process of revitalisation and the problems connected with it, represent some of the most difficult challenges encountered in recent years. The re-inclusion of post-mining areas in the structure of cities and villages is critical for changing the image of

mining. In the delivery of the extremely difficult process of regeneration, Poland has the advantage of being able to observe its EU partners in progress and of being able to demonstrate a number of excellent solutions. The subject and the way of creating the road map were the result of cooperation between 20 partners from 10 European countries within ENMR. They attempted to define the most important factors determining the development possibilities of broadly defined European mining in the face of economic and environmental changes in the world.

Development of Flotation Process for Enrichment of Ganesh-Himal Lead-zinc Sulphide Ore from Nepal

Singh, Ratnakar and Rao, D S and Banerjee, B and Bhattacharyya, K K (2008)
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In: Proceedings of XXIV International Mineral Processing Congress, 24-28 SEPTEMBER 2008, BEIJING CHINA.

The present paper deals with the development of flotation based process for enrichment of a lead-zinc sulphide ore from Ganesh-Himal region of Nepal. Detailed characteri-sation and flotation studies were carried out under vary-ing process conditions. The sample assayed 2.47% Pb with 13.6% Zn. The ore was predominantly made up of spahlerite and pyrite in association with subordinate amounts of galena, minor amounts of pyrrhotite and chalcopyrite. Dolomite was the main gangue. The modal analysis showed the probability of fair liberation of sulphides from gangues around 210 microns but the locking of galena with sphalerite and other sulphides continued to finer sizes. Under the optimum process conditions the rougher lead and zinc recoveries were 96.3% and 90% respectively. Multi-stage cleanings of rougher products proved helpful in improving the concentrate grade, meeting the required specification. - Based on the studies undertake a process flow-sheet for the concentration of the ore to individual lead and zinc concentrates was developed.
http://eprints.nmlindia.org/4163/