Coal particles should be ground to <53 μm size. Fine grinding improved liberation from the mineral matter, but very fine particles became trapped and were difficult to separate due to the dominance of surface forces.

### 99/00939 Chemical demineralization of a Turkish high ash bituminous coal

Bolat, E. *et al.* *Fuel Processing Technology*, 1998, 57, (2), 93–99.
One of the most common limitations on coal processes results from high mineral matter content. Therefore there are many technical and cost-effective advantages to demineralization of coal prior to usage. This work is aimed at reducing the mineral matter content of high ash, low sulfur Amasra bituminous coal from Turkey. Demineralization was studied using different acids (RF, HCl, $HNO_3$ and $R_2SO_4$) and 0.5 nitrogen aqueous NaOH in combination with either one or two of the acids. The optimum approach for the chemical cleaning of the coal was found to be the use of extraction with 0.5 N NaOH followed by leaching with 10% HCl. The maximum degree of demineralization obtained being 46.78%.

### 99/00940 Coal tar processing technology

Gao, J. and Lu, X. *Meitan Zhuanhua*, 1997, 20, (3), 8–12. (In Chinese)
Coal tar processing technology is discussed including primary distillation of coal tar, special distillation technologies, crystallization process for polyaromatic separation, processing and utilization of coal tar pitch and the economic scope of coal tar processing.

### 99/00941 Control of moisture addition to bulk solids

Halley, J. D. *et al.* U.S. US 5,777,890 (Cl. 364-500; C10L5/24), 7 Jul 1998, Appl. 585,337, 11 Jan 1996, 7 pp.
Water and a chemical treatment, such as ethylene glycol, are added to a bulk solid, such as solid fuel, in a material handling system. This paper proposes a method and apparatus for minimizing the amount of moisture added to the bulk solid while effectively controlling dust in the system. A moisture analysing means monitors the surface moisture level of the bulk solid and a calibration/measuring means determines the proper amount of chemical and water to be fed to the system for dust control. There are associated means for feeding the chemical treatment and water to the bulk solid and a dust analysing means, which monitors dust levels in the system and sends an electric signal to the calibration/measuring means to adjust chemical feed and water flow in the system.

### 99/00942 Copyrolysis of coal with coke-oven gas – effect of temperature

Liao, H. *et al.* *Ranliao Huaxue Xuebao*, 1998, 26, (3), 270–274. (In Chinese)
An investigation was conducted into the pyrolysis of Yanzhou bituminous coal with coke-oven gas (COG) in a pressurized thermal balance and a 10 g fixed-bed reactor. The results were compared with pyrolysis under $H_2$ and $N_2$. An important determinant on the yields of products and the extents of desulfurization and denitrogenation was temperature. The semi-coke yield decreased with increasing temperature and the oil yield, water formation and extents of desulfurization and denitrogenation increased. Compared with pyrolysis of coal under $N_2$ under the same conditions, the yields of oil and water and removals of sulfur and nitrogen in coal pyrolysis with COG and $H_2$ were higher with a lower semi-coke yield, due to the hydrogenation of coal with $H_2$. Compared with hydropyrolysis at the same total pressure and other operating conditions, the yields of semi-coke and water increased with decreasing oil yield in coal pyrolysis with COG. Whereas the desulfurization was virtually equal to that of the hydropyrolysis, the denitrogenation is lower.

### 99/00943 Corrosion performance of materials in coal-fired power plants

Natesan, K. *Corros. Its Control, Proc. Int. Conf. Corros.*, 1997 (Pub. 1998), 1, 24–35. Edited by Khanna, A. S. *et al.*, Elsevier, Amsterdam, the Netherlands.
Several technologies are being developed to convert coal into clean fuels for use in power generation. This paper discusses the coal-fired systems currently under development. Several modes of corrosion degradation that occur in many of these systems are identified and possible mechanisms of metal wastage are suggested. Included are available data on the performance of component materials in some of the environments and research needs to improve the corrosion resistance of various materials are presented.

### 99/00944 Development of modification process and slurrification technology for upgrading low grade coals

Usui, H. *Kemikaru Enjiniyaringu*, 1998, 43, (7), 498–503. (In Japanese)
By using a combined vacuum drying and tar-coating method, Banjarsari coal is upgraded and made into slurry. The upgraded coal has the similar properties to those of a bituminous coal. A feasibility study shows that the upgraded coal and a bituminous coal have almost the same price. In addition, high-concentration coal–water mixture can be made using the upgraded coal as feedstock.

### 99/00945 Dewatered porous coals

Shimizu, T. *et al.* Jpn. Kokai Tokkyo Koho JP 10 158,666 [98 158,666] (Cl. C10L5/00), 16 Jun 1998, Appl. 96/316,563, 27 Nov 1996, 5 pp. (In Japanese)
Obtained by heating the coal (e.g. brown coal) in the presence of oil components and removing the oil components after heating, dewatered porous coals have specific surface areas >10 $m^2/g$ calculated by the $N_2$ gas adsorption method and <160 $m^2/g$ calculated by the $CO_2$ adsorption method.

### 99/00946 Drying of coals by using supercritical carbon dioxide

Iwai, Y. *et al.* *Ind. Eng. Chem. Res.*, 1998, 37, (7), 2893–2896.
By using supercritical carbon dioxide at 313.2 K and 14.8 MPa, the drying of three types of coals (Witbank coal, Taiheiyo coal and Brau coal) was carried out. Furthermore, other adsorbent samples (wet zeolite and wet activated carbon) were adopted for comparison. Experimental results show that it is very difficult to extract water from wet zeolite, but easy to extract water from wet activated carbon and coals.

### 99/00947 The effect of acid treatment of coal on $H_2S$ evolution during pyrolysis in hydrogen

Soneda, Y. *et al.* *Fuel*, 1998, 77, (9/10), 907–911.
Gas chromatography–mass spectroscopy was used to analyse the amount of $H_2S$ evolved during pyrolysis for Taiheiyo, Datong, Wandoan and Mequinenza coals. Inorganic sulfur was eliminated from these coals by treating them with either $HNO_3$ or HF/HCl solution. The evolution of $H_2S$ in the low temperature region, below 500°C, was reduced by the chemical oxidation for the $HNO_3$-treated samples. Through the elimination of minerals, the amount of $H_2S$ evolved from acid-treated coal was markedly increased, at high temperatures, compared to the raw coals, especially Taiheiyo and Wandoan. X-ray fluorescence analysis and X-ray powder diffraction of coal and char were used to determine that calcium in the raw coal has an important role for the fixation of sulfur during pyrolysis.

### 99/00948 Efficient use and environmental benefit of coal-bed $CH_4$

Tian, B. *Meitan Zhuanhua*, 1997, 20, (3), 49–55. (In Chinese)
Chemical transformation of the coal-bed methane, the fuel market for coal-bed methane, the environmental benefits of coal-bed methane utilization and some proposals on its efficient use are areas covered in this review.

### 99/00949 Electrochemical lithium-doping of oil coke thermo-treated in air

Danil'chuk, T. N. *et al.* *Russ. J. Electrochem.*, 1998, 34, (7), 690–697.
A prolonged thermal treatment procedure for coke powders in air is presented. Variations in the structure and electrochemical properties of the coke that are caused by the calcining are studied. The paper presents charge–discharge curves and cyclic voltammograms for electrodes prepared from oil coke, in solutions of lithium salt in aprotic solutions. The degree of the electrolyte decomposition, occurring over the course of the electrochemical lithium-doping of cokes, is estimated. The thermal treatment is found to facilitate an increase in the reversible capacity and promote stability of the electrode operation during the cycling process. This is probably connected with alterations in the energy state and morphology of the surface of coke particles.

### 99/00950 Experimental study on the desulfurization of coal under supercritical water condition

Fan, W. and Tian, Y. *et al.* *Kuangwu Xuebao*, 1998, 18, (1), 55–61. (In Chinese)
The desulfurization of hard coal and coking coal from Guizhou Province were determined at 350°C and 400°C, near the critical temperature of water, using supercritical water. The results show that the desulfurization is better at 400°C and its rate decreases with increasing pressure. It is also necessary to consider the opposite effect of increasing water/coal ratio. The optimum desulfurization rate is controlled by the duration of reaction, but as the reaction time increases the quality of coal becomes worse. The content of organic sulfur in coal directly affects the desulfurization. The results in alkaline hydrothermal solution after one-day-long reaction indicate that the desulfurization rate of hard coal is higher than that of cooking coal. Further the desulfurization rate of cooking coal is decreased with increasing duration of reaction. There is an apparent difference in optimum reaction time between the methods of supercritical water and alkaline hydrothermal solution.

### 99/00951 *In-situ* desulfurization during gasification of high-S coal briquette in fixed-bed reactor at atmospheric pressure. 2. Contribution of Fe

Liu, Z. *et al.* *Meitan Zhuanhua*, 1997, 20, (3), 56–62. (In Chinese)
By experiment with X-ray diffraction the *in-situ* sulfur capture behaviour of limestone, dolomite, $Fe_2O_3$ and, most importantly, calcium–iron complex during the gasification of pyrite ($FeS_2$) was studied. $FeS_2$ began to decompose slowly at 650 K and atmospheric pressure of $H_2$, then as reaction temperature increased, the $FeS_2$ decomposition rate increased. Its initial decomposition rate was very high at 750 K. The functions of limestone and dolomite served were in desulfurization and as catalysis. They catalysed the decomposition of pyrite at low temperature (less than or equal to 850 K) and at high temperature (greater than or equal to 950 K) *in-situ* sulfur capture was their dominant function. $Fe_2O_3$ showed *in-situ* sulfur