Development of HyperCoal Production Process by Using Solvent Extraction

A new HyperCoal (ashless coal) power generation system is being developed to introduce coal directly into gas turbine. Solvent deashing process using organic solvent extraction is a key way to develop the system. Solvent extractions were carried out using ordinary solvents to get organic components from coals. It was succeeded in produding HyperCoal (ash content < 0.1%) for seven of nine colas at a laboratory scale. Light cycle oil (LCO) was found to be a useful solvent since it gave similar extraction yields to 1-methyl-naphthalene and dimethylnaphthalene. The mechanism of solvent extraction is discussed based on the data of structural analyses.

Coal	Extraction Yield with Dimethylnaphthalene (%)	Extraction Yield with Light Cycle Oil (%)
A	–	33.5
B	74.0	44.0
C	–	32.0
D	–	47.0
E	43.8	32.1
F	–	48.5
G	69.3	55.8
H	40.4	36.8

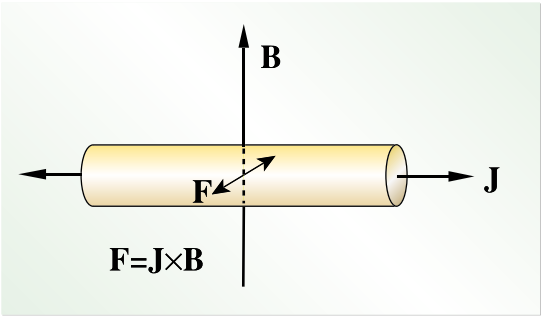
Table Extraction Yields with Dimethylnaphthalene and Light Cycle Oil at 360 °C Using a Flow-Type Extractor

Toshimasa TAKANOHASHI
Institute for Energy Utilization
e-mail: toshi-takanohashi@aist.go.jp
AIST Today Vol. 1, No. 5 (2001) 10

Nanotechnology and Materials Science & Technology

New microstructural Refinement Process of Metallic Materials by Electromagnetic Vibrations

Electromagnetic vibrations are induced in metallic materials during solidification by simultaneous application of alternating electric and stationary magnetic fields. Cavities form and collapse on the surface of solid crystals by application of electromagnetic vibration and then a huge pressure is exerted on the surroundings when they collapse. This pressure may result into the refinement of solid crystals. This mechanism has been applied to aluminum alloys, magnesium alloys and cast irons during solidification. It has been clarified that primary solid crystals are extensively refined.



Vibrating force developed by interaction of alternating electric and stationary magnetic fields

Kenji MIWA
Research Institute of Structural and Engineering Materials
e-mail: k-miwa@aist.go.jp
AIST Today Jpn. Vol. 1, No. 1 (2001) 15-18