HEAT MANAGEMENT

The new ‘must have’ of next generation vehicles
The growing demand for hybrid and electric vehicles requires new engineering solutions and one of the greatest challenges is how to manage heat. In this article, thermal management systems for lithium-ion batteries based on alkaline earth silicate composition fibres are introduced as a safety measure on cell-cell, module-module, and pack level in order to help prevent or mitigate thermal runaway propagation.

REFRACTORIES

Where did all the plastic straws go?
In past decades, humans consumed approximately 9x109 plastic beverage straws per day and most of them ended up in the oceans along with 5 to 10 million tons of other types of plastic waste dumped every year. Because of the deleterious environmental impact on aquatic life, many cities have banned their use in restaurants and other public spaces. Researchers from Brazil have effectively used recycled plastic straws as additives in refractory linings, reducing water vapor pressurization and allowing safer installation and reduced maintenance time.

Two-Stage Sintering of Eco-friendly Chromium-Free Bricks from Available Wastes
This contribution shows how hydroxides that are chemically precipitated from Al-dross and dolomite aggregate wastes can be used to form micronized refractory MgAl2O4 –spinel to produce chromium-free bricks. The processed spinel bodies showed a high refractory quality and are recommended for use as chromium-free bricks for applications at ≥1600 °C service temperature due to their high load-bearing capacity.

METAL CERAMIC SUBSTRATES

Metal ceramic substrates for highly reliable power modules
Metal ceramic substrates consist of a stack of bottom and top copper sheets separated by a ceramic sheet. The article introduces different ceramic materials used in metal ceramic substrates for an application in automotive and renewable energy segments for example as inverters for solar parks or as main inverters in electric vehicles or wind turbines.

GLAZES

Barium-titanate pigments for semiconductive glazes
This article introduces ceramic pigments of different color intensities for an application in the porcelain-faience industry for the production of semiconductive glazes. The pigments were prepared by solid-state synthesis and have a perovskite structure on the base of isomorphously substituted Ba2+ in BaTiO3 with different element-chromophores.

ENERGY STORAGE

Synthesis and Evaluation of Materials for High-Performance Supercapacitors
Nowadays, due to the lack of conventional energy resources, great attention is being paid to hydrogen as an energy carrier and its storage. Also, the development of energy-storage devices is certainly one of the current great challenges to meet the needs of modern society. To this end, supercapacitors (SCs) have gained much attention as next-generation power storage devices, mainly because of their safe operation and outstanding cycling life. In this article, lanthanum oxide-doped rGO (La2O3-rGO) nanosheets are introduced as promising materials for hydrogen storage in high-performance supercapacitors.

NANOPARTICLES

Physicochemical and Magnetic Properties of Nickel-Substituted Zinc Manganite Nanoparticles
A series of nanoparticles was prepared by a glycine assisted combustion method. The nanoparticles were characterized using X-ray diffraction, fourier-transform infrared spectroscopy, energy-dispersive X-ray spectroscopy, scanning electron microscope and transmission electron microscopy. The particles were polycrystalline in nature, and the magnetic measurements indicated that the nanostructure obtained shows room temperature ferromagnetism.