

Bölüm 11

ENERJİ MATERYALLERİ VE ENERJETİK MALZEMELER

Chapter 11

ENERGY MATERIALS AND ENERGETIC MATERIALS

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Özet

“Enerji Materyalleri”, enerji üretimi, dönüşümü, depolanması ve iletimi için kullanılan malzemeleri içerir. “Enerjetik Malzemeler” sınıfından patlayıcılar ise içlerinde depolanan büyük miktardaki kimyasal enerjiyi bir dış uyartımla (kendi kendini besleyerek) gerçekleşen ani ve şiddetli bir tepkime ile açığa çıkarabilen maddelerdir; enerjetik maddeler, patlayıcılar, iticiler ve piroteknikleri kapsar. Termik santrallerde ve motorlu taşıtlarda yakılan doğal yakıtlar (fosil ve yapay yakıtlar) ile çekirdek parçalanmasıyla radyoaktif ışınlar (alfa, beta ve gamma ışınları) yayınlayan veya ayrışma/kaynaşma (filyon ve füzyon) türü çekirdeksel tepkimeleri veren maddeler (nükleer santral yakıtları) başka kapsamlı derlemelerde yeterince tartışılmış olduğundan bu incelemenin dışında tutulmuştur. Ayrıca enerji materyallerinden ısı, elektrik vb. enerjisini makul bir dirençle ileten metaller ile elektrik enerjisini kritik bir sıcaklığın ötesinde pratikçe dirençsiz biçimde (kayıpsız olarak) ileten süper iletkenler bu derlemede yer almamaktadır. Dolayısıyla enerji materyalleri, esas itibarıyla kimyasal enerji, ışık, ısı ve mekanik enerji biçimlerinin elektrik enerjisine (veya tersine) dönüştürüldüğü pil ve akümülatörler, yakıt hücreleri, fotovoltaiik ve optoelektronik malzemeler ile termoelektrik ve piezoelektrik materyalleri kapsamaktadır. Bu derlemede bu sistemlerin tanım, köken, çalışma prensibi ve insan yaşamını kolaylaştırıcı uygulamaları tartışılacaktır. Buna ek olarak enerjetik materyallere, özellikle de uygun biçimde tetiklendiğinde büyük bir hızla kendi kendini sürdürebilen ekzotermik ayrışma reaksiyonu yoluyla yüksek ısı ve basınç açığa çıkaran patlayıcılara önem verilmiştir.

Anahtar Kelimeler

Piller, Yakıt Hücreleri, Optoelektronik Malzemeler, Termoelektrik Malzemeler, Patlayıcılar, İticiler, Piroteknikler, Enerjetik Maddeler

Abstract

Energy materials include substances used for the production, conversion, storage and transmission of energy. Explosives as a part of ‘energetic materials’ are substances of which the internally stored huge chemical energy is liberated with a (self-sustaining) rapid and violent chemical reaction initiated with an outer stimulant; energetic materials include explosives, propellants and pyrotechnics. Certain items such as natural fuels (fossil and synthetic fuels) burned in thermal power plants and motor vehicles, in conjunction with nuclear fuels (reacted in nuclear power plants) capable of emitting radioactive rays (alpha, beta and gamma rays) and undergoing nuclear fission or fusion reactions have been deliberately excluded from this review. Additionally, either metals conducting heat or electricity with a reasonable resistance or superconductor materials transmitting electricity with practically no resistance (i.e. without loss) do not take place in this work. Therefore, energy materials have been tailored to include batteries and accumulators, fuel cells, photovoltaic and optoelectronic materials, thermoelectric and piezoelectric materials, that basically convert and store chemical energy, radiation, heat and mechanical energy in the form of electrical energy (or *vice versa*). This review aims to discuss the definitions, backgrounds, working principles and applications of these systems to serve daily life. In addition to these, particular emphasis has been made on energetic materials, especially on explosives capable of liberating high amounts of heat and pressure in a rapid self-sustaining exothermic degradation reaction when appropriately stimulated.

Keywords

Batteries, Fuel Cells, Optoelectronic Materials, Thermoelectric Materials, Explosives, Propellants, Pyrotechnics, Energetic Materials

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